



Research article

Evaluating governance for sustainable development – Insights from experiences in the Dutch fen landscape

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ABSTRACT

Prominent strands of discussion in the literature on governance for sustainable development debate how change can be induced to enhance sustainability, and how to evaluate the interventions aimed at prompting such change. Strikingly, there are few contributions about how prominent ideas of inducing change deal with multiple governance criteria for pursuing sustainable development. Moreover, the way ideas about inducing change relate to criteria of governance for sustainable development is not yet studied in an empirical context. This paper therefore comparatively analyses how three prominent modes of sustainable development governance – adaptive management, transition management and payments for environmental services – relate to a set of five prominent criteria reported in the literature, namely: equity, democracy, legitimacy, the handling of scale issues and the handling of uncertainty issues. It finds that the academic debates on these three modes address these criteria with varying attention and rather fragmented, while in the empirical setting of the Dutch fen landscape several aspects relating to the studied criteria were present and substantially influenced the functioning of the three modes of sustainable development. Together, the analysis of the literature debate and the empirical data are able to show that a narrow evaluation perspective may fail to diagnose and capture relevant struggles and complexities coming along with governance for sustainable development relevant issues. The study shows that in order to advance our understanding of governance for sustainable development, it is indeed important to include multiple criteria in studying these modes. Moreover, the study shows the importance of including empirical experiences which manifest when different modes for sustainable development are applied in real-world settings.

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1. Introduction

Sustainable development is still “increasingly being presented as a pathway to all that is good and desirable in society” (Holden et al., 2014, p. 130). At the same time, intervention in current societal and biophysical processes to govern the move toward sustainable development can be characterised as complex (Duit et al., 2010) leading to partly unknown outcomes with various implications for affected groups (Meadowcroft, 2007). Therefore, various criteria are articulated as important by actors involved in, and by researchers studying, governing for sustainable development. Prominently debated ideas about how to evaluate governance for

sustainable development tend to be studied individually and include criteria such as equity (WCED, 1987), democracy (Meadowcroft, 2007), legitimacy (Backstrand, 2006), handling scale issues (Lebel et al., 2005) and handling uncertainty issues (Lafferty, 2004). In parallel, inducing change is prominently debated in sustainable development literature by means of adaptive management, transition management and payments for environmental services (e.g. McCauley, 2006; Voss et al., 2007; Kelsey Jack et al., 2008; Jordan, 2009; Olsson et al., 2008; Smith and Stirling, 2010; Armitage et al., 2011; Kinzig et al., 2011; Driessen et al., 2012). Yet surprisingly few contributions have been made about how prominent ideas of inducing change relate to popular sustainable development governance criteria.

This paper studies prominent ideas of governing change towards sustainable development (in terms of adaptive management, transition management and payments for environmental services) in relation to prominent ideas of what ‘good’ governance for

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sustainable development should look like (i.e. in terms of attention for equity, democracy, legitimacy, handling scale issues, and handling uncertainty issues). Here, the main research aim is to enhance our understanding of governance for sustainable development, by assessing how prominent strategies for sustainable development address criteria of governance for sustainable development, both in literature and in practical interventions in the Dutch landscape. The next section elaborates on the criteria and modes studied, and explains the research approach applied. Then the observations from the literature study and the empirical analysis are presented. Finally, we discuss the implications of these observations in the context of understanding governance for sustainable development.

2. About evaluating governance for sustainable development

There are only a few studies that take a broad perspective when evaluating modes of governance for sustainable development. However, narrowing a perspective down to a single aspect or criterion or to a strategy's own priorities may lead to missing out explanatory factors. Various frameworks proposed to study modes of governance for sustainable development (Van Zeijl-Rozema et al., 2008; Hysing, 2009; Arnouts et al., 2012; Driessen et al., 2012) do not include all of the prominent criteria identified as important in the evaluation of governance for sustainable development. Only a few authors actually emphasise the importance of taking a wider perspective when evaluating sustainable development governance. According to them, evaluation against a single criterion would be insufficient to reveal issues encountered both in theory and in practice (Adger et al., 2003, 2005; Lafferty, 2004; Jordan, 2008). Adger et al. (2003, 2005) advocate a broad analysis of environmental decision-making to cover efficiency, equity, effectiveness and legitimacy. Biermann et al. (2010) propose a broad perspective by means of a set of five interdependent analytical problem categories to be included in studying sustainable development governance: architecture, agency, adaptiveness, accountability, and allocation and access (Biermann et al., 2010). It is possible that no one mode of governance could entirely fulfil such a set of multiple criteria. Jordan (2008) observes that elements which indicate and contribute to governance for sustainable development “can and often do conflict sharply with one another” (p. 20). The application of multiple criteria may therefore involve trade-offs (cf. Press, 1994; Jordan, 2008; Jordan et al., 2010; Hildingsson et al., 2012). Analysis of instances of neglecting criteria may help to clarify and explain conflicts and tradeoffs.

The evaluation of governance for sustainable development is of course a normative exercise. Understanding initiatives to enhance sustainable development inherently implies studying: how such interventions are decided upon, by whom and why. A consideration of criteria to evaluate interventions aimed at sustainable development, could lead to the idea of proposing conditions, and subsequently, the suggestion of a blueprint for action. Here, we rather consider these criteria as expressions of what researchers have found to be relevant in association to governance for sustainable development. Various researchers have brought these criteria forward, because intervening for sustainable development is inherently normative. We do not have a specific or a priori preference for one or more of these criteria. We investigate how these criteria are addressed in the discussions on the three prominent modes of governance. By studying how these criteria are addressed in empirical practices, we aim to further reflect on the relevance and usefulness of these criteria in order to understand attempts to govern for sustainable development.

This study includes criteria which are 1) each individually argued to be crucial in evaluating governance for sustainable

development; and 2) included in the sets as argued by Adger et al. (2003) and by Biermann et al. (2010). This leads to inclusion of equity, democracy, legitimacy and handling scale issues. Although not explicitly included in the sets as argued by Adger et al. (2003) and Biermann et al. (2010), handling uncertainty issues is also included here, as it is also advocated in the literature as an important issue that influences sustainable development governance (Meadowcroft, 2002, 2007; Lafferty, 2004). Governance for sustainable development involves a capacity to intervene in the distribution of natural resources, while dealing with numerous uncertainties, unpredictable responses and the inability to know all the needs of the current and future generations. Handling of uncertainty issues is argued to be important for evaluation of governance for sustainable government because it plays a major role in anticipating possible knowledge gaps, vulnerabilities and risks (Meadowcroft, 2002, 2007; Lafferty, 2004). These five criteria of governance for sustainable development are further outlined below, and summarised in Table 1. It may be noted that effectiveness is not included in the present study, although it is identified by some as a criterion for evaluating governance for sustainable development. Effectiveness refers to an intervention attaining its goal as a result of a deliberate intention to do so (Adger et al., 2003; Backstrand, 2006; Huitema et al., 2011). Identifying a specific causal relationship between an intervention and attainment of its intended impact is very complex and requires a research design that lies beyond the scope of the present study. The present study does, however, include an assessment of how the three modes are oriented towards aspects of sustainable development in the studied practices.

2.1. Criteria

Firstly, the WCED (1987) identified *equity* as pivotal to sustainable development. Equity has been further studied in the context of sustainable development by various authors (Coenen and Halfacre, 2003; Ikeme, 2003; Thomas and Twyman, 2005). The examination of equity to evaluate governance for sustainable government reveals firstly that it comprises distributional features in form of intergenerational and spatial allocation of negative impacts, hazards or threats, and of positive impacts, benefits and access to resources (WCED, 1987; Adger et al., 2003; Biermann et al., 2010). Secondly, equity refers to procedural features, particularly to the ideal of making unbiased decisions and applying regulations without discrimination (Syme et al., 1999; Coenen and Halfacre, 2003; Lee and Jamal, 2008). In assessing intergenerational and spatial distribution impacts and thus whether decision-making is considered as equitable, this study uses Stone (2001) conception: equity occurs when distributions are regarded as fair by involved and affected groups (even though distributions may include both uniformity and unevenness) and when decision-making is regarded as unbiased by involved and affected groups (Stone, 2001).

When democratic processes lead to a selection of decision-makers who believe that sustainable development is important, set normative goals, intend to steer, and determine priorities and possible sacrifices. *Democracy* is included here with the understanding that representation and participation contributes to consensus, public support and improving the quality and outcomes of decision-making for sustainable development (Lafferty, 2004; Meadowcroft, 2007; Rauschmayer et al., 2009). Therefore, related decisions should be representative and made by: leading and non-leading groups; governmental and non-governmental groups; and groups that would profit and that would lose from such decisions (Davies, 2002; Meadowcroft, 2002; Rauschmayer et al., 2009). In terms of democracy, several scholars propose representation and participation in decision-making as aspects to evaluate governance

Table 1
Summary of criteria of governance for sustainable development. Numbers of the rows are used in the text for cross-referencing to the corresponding aspect.

| Criterion | Evaluation aspects | References |
|--------------------------------|--|--|
| Equity | (1) Fair intergenerational and spatial distribution and access | WCED (1987), Adger et al. (2003), Biermann et al. (2010) |
| Democracy | (2) Striving for unbiased decision-making (3) Representative decision-making for public goals | Syme et al. (1999), Coenen and Halfacre (2003), Lee and Jamal (2008), Davies (2002), Meadowcroft (2002), Rauschmayer et al. (2009) |
| Legitimacy | (4) Participation of societal groups in plan and decision-making, particularly in goal-setting (5) Ability of decision-makers to explain and justify their decisions | Coenen et al. (1998), Davies (2002), Meadowcroft (2002), Lafferty (2004), Meadowcroft (2007) |
| Handling of scale issues | (6) Addressing an issue at relevant spatial, temporal and institutional scales and levels (reducing externalities) (7) Attention on linking of societal and ecological assets | Adger et al. (2003), Backstrand (2006), Biermann et al. (2010), Schouten and Glasbergen (2011) Lebel et al. (2005), Huitema et al. (2009) Meadowcroft (2002), Lebel et al. (2005), Huitema et al. (2009) |
| Handling of uncertainty issues | (8) Explicitly acknowledging uncertainties (preferably categorising and indicating magnitude of uncertainty range and sources driving uncertainties) (9) Learning and use of insights gained (including knowledge management; learning during policy-making; using local knowledge in decision-making; and using experimentation) | Van Asselt and Rotmans (2002), Renn et al. (2011) Lafferty (2004), Cooney and Lang (2007), Collier and Scott (2008), Huitema et al. (2009) |

Source: Den Uyl (2014).

for sustainable development (Coenen et al., 1998; Davies, 2002; Meadowcroft, 2002, 2007; Lafferty, 2004). Some scholars advocate that public participation in decision-making on sustainability issues should extend also to goal setting (Davies, 2002; Meadowcroft, 2007). Here, the representation of a plurality of groups and participation of lawful non-state bodies in decision-making for public goals are included as two aspects of democracy in governance for sustainable development.

Legitimacy is discussed in various ways as a criterion of governance for sustainable development, and various aspects are found to contribute to legitimacy in the context of addressing sustainability issues (Adger et al., 2003; Backstrand, 2006; Schouten and Glasbergen, 2011; Edelenbos and Teisman, 2013). Cashore (2002) identifies pragmatic, moral and cognitive legitimacy. Backstrand (2006) defines input legitimacy in terms of representation, accountability and transparency, and output legitimacy in terms of adequacy of institutional design in facilitating desired outcomes and delivering intended goals. Schouten and Glasbergen (2011) identify that following formal regulations, moral justifications by an institution for its actions and consent by various audiences contribute to legitimacy. Some aspects of legitimacy approximate to aspects of equity and democracy. Representation of interests in decision-making in the context of legitimacy is similar to representative decision-making in the context of democracy. Adhering to rules in context of legitimacy is similar to aspect of procedural justice in the context of equity. Public acceptance in the context of legitimacy – i.e. a community's general approval of decisions made according to those affected and/or to those charged with assessing acceptability (cf. Cashore, 2002; Adger et al., 2003; Schouten and Glasbergen, 2011) – comes very close to distribution being regarded as fair by stakeholders and decision-making procedures being regarded as unbiased, in the context of equity. To prevent overlap with equity and democracy, this study focuses on accountability as evaluation aspects of legitimacy. Here, accountability is understood as decision-makers taking responsibility for and being able to explain and justify their decisions (cf. Backstrand, 2006; Biermann et al., 2010; Schouten and Glasbergen, 2011).

Handling scale issues is important, because actors may push issues likely to involve negative consequences further away in space, time or institutional level, and/or draw issues likely to lead to

positive consequences nearer to them (or to scales where decision-making actors have most power) (Lebel et al., 2005; Huitema et al., 2009). It can also be important because the biophysical scale of an environmental problem rarely coincides with the jurisdictional, institutional or governmental scale (Meadowcroft, 2002; Lebel et al., 2005; Huitema et al., 2009). Some researchers argue that to address scale adequately in environmental issues, an adaptable and evolving institutional context with a high degree of diversity and redundancy may be more effective than a new governing order tailored to specific biophysical dimensions (Meadowcroft, 2002; Huitema et al., 2009). Here, handling of scale issues is understood as: enhancing problem-solving and reducing negative externalities across scale levels (likely to be cross-spatial and to reflect medium as well as long-term goals and to engage multiple institutional levels); and attention to matching societal and ecological assets (preferably in a complex, "rich" institutional setting).

Uncertainties may occur "due to behavioural and societal variability, value diversity, technological surprise, ignorance and indeterminacy" according to Van Asselt and Rotmans (2002, p. 75) who state that although "it is difficult to define uncertainty" (p. 78), this can be achieved to some extent by classifying the type or source of uncertainty, i.e. whether it is due to variability or due to limited knowledge. Here, handling uncertainties is firstly understood as explicitly acknowledging them. This action associates with addressing uncertainties coming from variability, which can be done through categorisation in terms of, for example, scenarios, indicating magnitude and indicating source (Van Asselt and Rotmans, 2002; Renn et al., 2011). Secondly, handling uncertainties can be understood as learning and enhancing insights – to address uncertainties related to limited knowledge – and can be stimulated through the management of knowledge (Lafferty, 2004) generated or discovered during the policy-making process (Lafferty, 2004; Cooney and Lang, 2007), including local knowledge in decision-making (Collier and Scott, 2008), and experimentation (Cooney and Lang, 2007; Huitema et al., 2009).

2.2. Prominent modes of governance for sustainable development

Adaptive management, transition management and payments for environmental services (PES) feature prominently in literature

on governance for sustainable development. The governance literature tends to distinguish modes based on the role of the government. The literature on governance in the specific context of sustainable development, tends to distinguish modes based on how they induce change. The high degree of attention these modes receive leads to their selection for this study. Their dominance is evident in overview studies by Voss et al. (2007), Jordan (2009), Smith and Stirling (2010), Voss and Bornemann (2011) and Driessen et al. (2012) and in attention to these approaches in leading journals such as *Science* (Kinzig et al., 2011), *Nature* (Kleijn et al., 2001; McCauley, 2006), *PNAS* (Kelsey Jack et al., 2008; Olsson et al., 2008), *Global Environmental Change* (Folke, 2006; Armitage et al., 2008; Satake et al., 2008; Armitage et al., 2011), and *Philosophical Transactions of Royal Society B* (Folke, 2003).

These ideas about inducing change are each discussed in terms of their own diagnosis of the problem and emphasis on how to steer. In short, discussion on *adaptive management* is based on the notion that scientific progress and cooperative learning-by-doing among groups supports sustainable development. This notion originated in a concept developed by ecologists in 1970s and 1980s (Holling, 1978; Walters, 1986). Adaptive management is oriented towards enhancing the capacity of an ecological system to recover after drastic events, to cope with chronic stress and to reduce its vulnerability to collapse (Folke et al., 2002). Here, adaptive management is understood as enabling a social-ecological system to sustain itself through learning-by-doing and cooperation and to avoid collapse, while enhancing a system's capacity to respond to changing circumstances (Walters and Holling, 1990; Lee, 1993, 1999; Berkes et al., 2003; Olsson et al., 2004a; Armitage et al., 2008).

Discussion on *transition management* is based on the notion that drastic, fundamental transformations of societal structures – assisted by technological development and innovation that is coordinated by public bodies – support sustainable development. Research on transition management has been developed since the 1990s by scholars studying historical technological developments (Kemp, 1994; Kemp et al., 1998). Transition management is oriented towards preventing collapse by facilitating continual innovation and technological and societal progress (Rotmans et al., 2001). Transition management is understood here as fundamentally altering the structure of an area or a socio-technological system to orient it towards a long-term vision on a trajectory stemming from learning, experimentation and innovation in order to prevent environmental crisis (Rotmans et al., 2001; Kemp et al., 2007; Rotmans and Loorbach, 2009; Grin et al., 2010).

The notion that developing and reshaping economic structures and economic value systems for environmental and natural resources management supports sustainable development underpins discourse on *PES*. Developed by economists, policymakers and financial institutions in the 2000s (Pagiola et al., 2002; Wunder, 2005), the concept of *PES* is based on economic theory and proposes a market-type solution to environmental problems (Vatn, 2010). *PES* are oriented towards reducing undesired impacts of current processes on biophysical environment and improving people's livelihoods (Wunder et al., 2008). The *PES* concept is understood here as making biophysical systems and landscape conservation economically viable through schemes which reduce negative environmental externalities and contribute to sustainable livelihoods (Pagiola et al., 2002; Wunder et al., 2008). Within the *PES* debate, there is a notable focus on poverty alleviation (e.g. Grieg-Gran et al., 2005; Pagiola et al., 2010), on agri-environmental schemes (e.g. Kleijn et al., 2001; Dobbs and Pretty, 2008) and on economic efficiency (e.g. Engel et al., 2008; Borner et al., 2010).

2.3. Research approach

The research here is focused on identifying whether and, if so, how aspects of the selected criteria are addressed in the literature on the modes of governance for sustainable development studied, and in settings where such modes are applied. We identify whether the criteria have been considered (or not) – and if so, in which way –, to which possible results this may have led, and whether explicit consideration of these criteria contributes towards sustainable development.

For the purpose of the literature study, the Scopus search engine was used with the search terms 'adaptive management', 'adaptive governance' and 'adaptive co-management'; 'transition management'; and 'payments for environmental services' and 'PES'. The present study includes literature published until August 2014 that introduced or originally articulated the concept of each respective mode and made reference to concepts of 'equity', 'democracy', 'participation', 'representation', 'legitimacy', 'accountability', 'scale', 'uncertainty' and 'uncertainties'; and that has achieved a relatively high number of citations or contributed a specific observation about how a mode of governance is orientated towards sustainable development or steering. A criterion is viewed as a central consideration when it is explicitly addressed, not a central consideration when it is not addressed at all and as addressed in a few studies when it is included by at least two studies. When a criterion is only partly addressed or addressed only in a specific sub-debate, this is indicated as such.

To gain insight into how the criteria are addressed in practice, empirical examples of the three modes were qualitatively evaluated by examining how they were addressed by the leading actors involved (i.e. the most important coordinator and decision maker). In total 15 cases were studied in Dutch fen landscape, which include 4 adaptive management, 3 transition management and 8 payments for environmental services cases. These cases were selected based on attending several public events and symposia, consulting documentation presenting multiple initiatives, and consulting policymakers and various stakeholder groups. In brief, these cases were recognised as aligning with the elements of either adaptive management, transition management or payments for environmental services, when they were either oriented towards: learning-by-doing and cooperation; drastic transformation of the landscape through a technical spatial approach; or introducing new types of voluntary payment schemes for the delivery of e.g. water management, landscape management or biodiversity management. A further explanation of the setting in the Dutch fen landscape, and details of studied cases can be found in the Appendix B.

Data for empirical analysis were mainly collected through interviews with key actors and documentary review. Interviewees were from leading and non-leading groups, and represented various positions and/or interests, such as governmental bodies, agricultural interest groups, nature conservation groups, and process-management consultancies. These individuals (48 in total) were asked to identify other key researchers, practitioners, and policymakers relevant to the case studied (see Den Uyl, 2014). Interviews, usually lasting about one-and-a-half to two hours, were semi-structured, conducted face-to-face or by telephone and, in some *PES* cases, partially by email. A standard list of questions was used to obtain information about each case and about aspects of its orientation towards sustainable development and steering. Examples of the questions asked include: "Who is/are the leading and key decision-making actor(s) in this case?"; "Are there any problematic issues, and if so, which and why?" (see for a full list of the questions: Den Uyl, 2014). At end of the interview, the respondent was given opportunity to provide any further information they considered relevant to the case in question. An interview report

was sent back to interviewees for confirmation, which they could amend if necessary. Project documentation included internal documentation (such as minutes of meetings, formal correspondence between societal groups and leading governmental bodies, brochures and policy documents) and documentation prepared by external parties (including newspaper clippings, reports written by third parties, and some peer-reviewed academic publications) (see Den Uyl, 2014).

3. Analysing criteria in prominent modes in literature and practice

The findings on how the prominent criteria for governance for sustainable development are addressed in the literature on the three modes studied is summarised in Table 2. Handling scale issues and handling uncertainty issues have relatively more coverage than equity, democracy and legitimacy in the literature on the three studied modes of governance. There are some notable gaps and issues such as the point that spatial scale is argued as a point to be addressed in transition management (Foxon et al., 2009; Smith et al., 2010). Several critics observe that transition management is too vague regarding the normative and political aspects of organising learning and experimentation (Van de Kerkhof and Wieczorek, 2005; Shove and Walker, 2007; Foxon et al., 2009; Meadowcroft, 2009; Voss et al., 2009; Voss and Bornemann, 2011). Learning is absent in the PES debate on economic efficiency. Democracy seems to be addressed slightly more in these debates than equity and legitimacy. Overall, equity and legitimacy appear to receive the least attention in the debates on these modes. Where in the text below a reference is made to observations about the literature debate, these observations can be found in Appendix A, which elaborates on the findings of the literature review. This section relates the findings of this literature review with an analysis how these criteria are addressed in the studied empirical practices.

3.1. Equity

The empirical analysis shows that equity was not widely and explicitly considered by leading actors in the four *adaptive management* cases – though several issues related to equity occurred. None of the leading actors strove to base their decisions on an equitable distribution of impacts (i.e. aspect (1) in Table 1), or explicitly considered or publicly discussed compensation for possibly disadvantaged groups (aspect (2)). While consensus-building among actively involved parties was typically addressed in all four cases, three of them involved no development of unbiased decision-making or of wider public acceptance of intended interventions. To give a more specific example, in one of the cases, although intended measures would affect farmers, the agricultural interest group was not invited by the leading actor to participate in the decision-making process. The leading actor expected the agricultural group would “make trouble” and “delay the process”. A focus on consensus-building among only a selection of parties and the exclusion of groups expected to complicate the process may make decisions more acceptable to those who were involved, but reduce acceptability for those groups affected but not involved (cf. Meadowcroft, 2002; Cooney and Lang, 2007). At the same time, issues arose when decisions were needed about who would profit from an experiment and who would not and when certain decisions were publicly disputed. Overall, conflicts about the equitable distribution of an intervention's negative impacts tended to limit the scope of the adaptive management practices studied.

The empirical observations suggest that the little attention which has been given so far to fair distribution of impacts (cf. aspect (1)) in thinking about *transition management* (as identified by

Shove and Walker (2007)) can also be recognised in practice. Equity aspects ((1) and (2)) were not explicitly addressed by the leading actors in the studied transformation cases. For example, the cases showed that although interventions intended for long-term sustainability objectives could possibly benefit future generations, large-scale restructuring of an area's land-uses may have substantial negative impacts on current local communities (cf. (1)). The leading actors did not explicitly address how the intended transformations would benefit a fair distribution of positive and negative impacts among current and future generations (cf. (1)). Explicitly striving for unbiased decision-making was also not addressed by the leading actors in these cases (cf. (2)). That can be considered as relatively striking, as in two of the cases a lack of support and significant conflicts were seen to stagnate the transformation process.

Despite scholarly focus on poverty alleviation in PES, the cases analysed seem not to contribute to a more equal distribution of financial means. Although PES programmes in the Dutch fen landscape may have been intended to improve the economic situation of landscape's providers (i.e. mostly dairy farmers), analysis by Den Uyl (2014) shows that actual contribution of eight cases to economic viability of land-use appears to be marginal (cf. (1)). The equity aspect of striving for unbiased decision-making is not explicitly addressed by the leading actors in the cases studied (cf. (2)). This does not mean that the plan-making and implementation processes were unproblematic in these cases. In several of the cases, disputes about intended management practices and financial rewards occurred. For example, a legal conflict between farmers and biodiversity conservationists about mowing schedules and chick protection (of a bird species which breeds only on grassland, the Black-tailed Godwit) whereby farmers wanted to optimise their grass management, and the conservationists wanted a longer period of undisturbed grass, to enable a high chick survival rate. Other conflicts concerned objections by participants to higher-level government decisions on not permitting payments; in two cases where national government did not allow regional government to spend payments on environmental services, because that would not be in line with EU regulation on state funding.

3.2. Democracy

In parallel to the growing attention in the literature to participation and representation, decision-makers (mostly water boards and municipalities) in the *adaptive management* cases studied addressed participation – in the sense of input from multiple groups (aspect (1)) and joint decision-making (2) – in different ways and to different extents. However, that did not necessarily mean that no issues were encountered or that the leading actors applied a wide and inclusive invitation policy. The intention of the leading parties to include participation was based on the idea that the development of shared knowledge through experimentation would help to increase support and willingness for adaptation of land-use practices. However, attempting to enhance participation in the project design and decision-making did not mean that no conflicts were encountered in implementation stage. For example, leading actors applied a selective invitation policy in three of the cases studied. Subsequently, several issues and conflicts were encountered in the implementation stage over, among other things the experimental management and the decision-making process of the project, and issues related to unclear participation rights in the experimental management. The observed experiences show that participation (of a selection of affected groups) in the project design and decision-making processes does not necessarily result in development of ways to deal with challenges of wider more-inclusive participation.

Table 2
Overview of how the literature on each of the three modes addresses the criteria for governance for sustainable development. A criterion is viewed as a central consideration when it is explicitly addressed, not a central consideration when it is not addressed at all, and as addressed in a few studies when it is included by at least two studies. Comments in this table refer to both of the aspects as noted in Table 1, except when indicated otherwise (i.e. in the last row). Adapted from Den Uyl (2014).

| Criterion | Mode of governance for sustainable development | | |
|-----------------------------|--|--|---|
| | Adaptive management | Transition management | Payments for environmental services |
| Equity | Addressed in a few studies (Lee, 1999; Hatfield-Dodds, 2006; McDougall et al., 2013). | <ul style="list-style-type: none"> - Not centrally addressed by proponents; - Lack of attention to equity articulated by critics (Shove and Walker, 2007; Hendriks, 2009; Meadowcroft, 2009; Smith and Kern, 2009; Voss et al., 2009; Smith and Stirling, 2010). | <ul style="list-style-type: none"> - Central consideration in poverty alleviation (Corbera et al., 2007; Kelsey Jack et al., 2008; Adhikari and Agrawal, 2013; McDermott et al., 2013); - Addressed in a few studies in terms of economic efficiency (Borner et al., 2010; Pascual et al., 2010); - Not addressed in agri-environmental schemes. |
| Democracy | <ul style="list-style-type: none"> - Participation of multiple groups increasingly emphasised (Lee, 1993; McLain and Lee, 1996; Jiggins and Röling, 2000; Olsson et al., 2004a; Olsson et al., 2004b; Clark and Semmahasak, 2013; Chaffin et al., 2014); - Not yet though in goal setting. | <ul style="list-style-type: none"> - Participation considered in a few studies (Kemp and Martens, 2007; Grin et al., 2010); - Lack of attention on democracy heavily articulated by critics (Shove and Walker, 2007; Foxon et al., 2009; Hendriks, 2009; Meadowcroft, 2009; Smith and Kern, 2009; Voss et al., 2009; Smith and Stirling, 2010; Voss and Bornemann, 2011). | <ul style="list-style-type: none"> - Addressed by a few studies in terms of poverty alleviation and economic efficiency (Corbera et al., 2007; Pascual et al., 2010; Bremer et al., 2014); - Not addressed in agri-environmental schemes. |
| Legitimacy | Addressed in a few studies (recently) (Cosens, 2013; Plummer et al., 2013; Chaffin et al., 2014; Lundmark et al., 2014). | <ul style="list-style-type: none"> - Not addressed by proponents; - Articulated by critics as insufficiently addressed (Shove and Walker, 2007; Hendriks, 2009; Voss et al., 2009; Smith and Stirling, 2010). | Addressed in a few studies (since recently) (Glicksman and Kaime, 2013; Vatn and Vedeld, 2013; Nicolaus and Jetzkowitz, 2014). |
| Handling scale issues | <ul style="list-style-type: none"> - Central consideration (Walters, 1986; Lee, 1993; Gunderson, 1999; Pulwarty and Melis, 2001; Roe and Van Eeten, 2002; Berkes et al., 2003; Huitema et al., 2009; Chaffin et al., 2014); - Relation to wider institutional setting addressed by a few studies (Folke et al., 2005; Hahn et al., 2006; Olsson et al., 2006; Brunner, 2010; Clark and Clarke, 2011; Chaffin et al., 2014). | <ul style="list-style-type: none"> - Time scales and functional scales central considerations (Rotmans et al., 2001; Kemp et al., 2007; Grin et al., 2010); - Spatial scales observed as not yet addressed (Foxon et al., 2009; Smith et al., 2010). | <ul style="list-style-type: none"> - Identification of spatial and temporal boundaries, and connecting buyers and providers centrally addressed (e.g. Kleijn and Sutherland, 2003; Van der Horst, 2007; Dobbs and Pretty, 2008; Engel et al., 2008; Wunder et al., 2008; Merckx et al., 2009; Vatn, 2010); - Cross-scale issues addressed in a few studies (Satake et al., 2008; Kinzig et al., 2011). |
| Handling uncertainty issues | <ul style="list-style-type: none"> - Central consideration (e.g. McLain and Lee, 1996; Olsson and Folke, 2001; Berkes et al., 2003; Gunderson and Light, 2006; Cooney and Lang, 2007; Pahl-Wostl et al., 2007; Henriksen and Barlebo, 2008); - Some critics mention lack of attention on learning-by-doing under contested uncertainties and institutional complexities (Lee, 1999; Meadowcroft, 2007; Voss et al., 2009; Smith and Stirling, 2010). | <ul style="list-style-type: none"> - Learning and experimentation a central consideration (Rotmans et al., 2001; Kemp et al., 2007; Grin et al., 2010; Smith and Stirling, 2010; Voss and Bornemann, 2011); - Lack of attention on normative aspects heavily articulated by critics (Van de Kerkhof and Wiczorek, 2005; Shove and Walker, 2007; Foxon et al., 2009; Meadowcroft, 2009; Voss et al., 2009; Voss and Bornemann, 2011); - Explicitly acknowledging uncertainties (i.e. aspect (8)) not considered. | <ul style="list-style-type: none"> - Using new insights and monitoring is central in agri-environmental schemes (e.g. Kleijn et al., 2001; Kleijn and Sutherland, 2003; Swagemakers et al., 2009); - Addressed in a few studies on poverty alleviation (Holguín et al., 2007; Petheram and Campbell, 2010); - Absent in the debate on economic efficiency; - Uncertainties are explicitly acknowledged uncertainties (i.e. aspect (8) in Table 1.) in a few studies (recently) (Derissen and Quaas, 2013; Lennox et al., 2013; Ruckelshaus et al., 2013). |

The studied practical experiences with *transition management* show that although the intention was to include local societal groups in plan-making (cf. (1)), decisions were taken mainly by the regional authority (cf. (2)). For example, these cases included no attention on representation and participation in: choosing indicators for monitoring and evaluation; deciding on the frequency of evaluation and selection of measures and trajectories to evaluate; and relating evaluation and selection criteria to the broader debate on sustainable development. Given that theoretical consideration of representation and participation are seen as crucial to steering interventions, it would be helpful to gain greater insight into why they are not given same weight in actual cases of transformation. The need for such insight becomes clear, considering that the transformations examined were shown to be particularly susceptible to stagnation. To further explain: in all three cases, input from advisory groups (mainly represented public and private nature conservation organisations, landscape conservation groups and agricultural groups) was considered to develop possible goals and implementation pathways for the transformation plan. However, some of those consulted (in all three cases) indicated that it was unclear whether and which alternatives were considered in the plan-making process, with some interviewees indicting that no alternatives were considered by the leading actor. The findings indicate that the regional government is the main (only) decision-maker in all three cases.

In a similar vein to the literature debate on *PES*, participation in plan-making processes tended to be addressed in the studied cases (cf. (1)), whereas the aspect of representative and participative decision-making for societal goals received far less attention (cf. (2)). In the studied *PES* cases, decision-makers varied greatly (i.e. from provinces and municipalities to public-private intermediary organisations and private organisations). Participation of farmer and biodiversity conservation groups was usually included in the plan-making and implementation, with exception of the national government *AES* programme. The studied schemes include some degree of citizen participation (i.e. local farmers in all cases, and local biodiversity conservation groups in several cases) and multiple groups in the plan-making, and in several of the implementation processes.

3.3. Legitimacy

While legitimacy has – since recently – been receiving increasing attention in the literature on *adaptive management*, it has not been observed to receive similar attention in the empirical cases studied. Actors involved in the studied adaptive management cases reported various issues in the decision-making context (such as diffuse responsibilities for water management and land-use allocation between provinces and water boards) that were problematic for legitimacy. Leading actors in these three cases however did not explicitly prepare to explain and justify decisions made in this context (cf. aspect (5)). In addition, conflicts and uncertain participation in, and support for, the experimental management (in three cases) tended to limit the adaptive process. Actors consulted in three of the studied cases did emphasise the necessity of an experienced team and guidance was needed to deal with uncertainties and complexities in decision-making process. Some of those consulted (in three of the studied cases) proposed that the accountability of decision-makers could be increased by reducing administrative uncertainties, increasing more effective governmental coordination, and ensuring a clear division of responsibilities.

The plea made by several researchers that legitimacy is important in thinking about *transition management*, can be recognised in the studied cases. General public protests, protests from multiple

affected public and private actors, lack of public acceptance and no support from several local authorities leads to questions over whether the decision-makers (i.e. regional authority) were able to sufficiently explain and justify the decisions and proposed interventions (in two of the cases studied) (cf. (5)). A striking example of different perceptions of public support is provided by one of the cases, where the leading actor (in this case the regional authority) was proud to have achieved a signed agreement among all actors involved. It was labelled as an “icon project”, and promoted as a successful approach for the “fen meadow problems”. However, quite quickly after signing, enthusiasm for the initiative dwindled, and national government imposed budget cuts on nature conservation measures. Moreover, when speaking to the local groups and the local authorities involved, it became clear that they strongly opposed several elements of the project, and some of them even suspended their cooperation and support. In the third case, the leading actor regarded trust relations with societal groups as generally neutral – while a local nature conservation interest group reported trust in the leading actor to take decisions in a transparent way to be extremely low. The observed lack of acceptance of decisions made about the intended transformations add weight to earlier proposals that transition management processes could to benefit from more attention being paid to legitimacy (Shove and Walker, 2007; Hendriks, 2009; Meadowcroft, 2009; Voss et al., 2009; Smith and Stirling, 2010).

The growing attention in the literature for legitimacy in the context of *PES* seems to make sense – considering that the cases studied show some issues related to the ability of decision-makers to explain and justify how their decisions influence the functioning of these *PES* programmes (cf. (5)). In the earlier mentioned examples of a legal conflict between farmers and biodiversity conservationists about mowing schedules and chick protection and strong objections and perceived unfairness by participants to higher-level government decisions on not permitting payments, the decision makers were apparently not able to sufficiently explain and justify the decisions made. While issues of explaining and justifying decisions may occur in practice, they appear not to have been explicitly addressed by leading actors in the studied *PES* cases. More understanding may be needed as to why leading actors in *PES* cases do not consider the ability of decision-makers to explain and justify their decisions to be relevant (whilst it does influence the functioning of these schemes).

3.4. Handling scale

Some of the scale issues as discussed in the *adaptive management* literature can also be recognised in the empirical cases. Actors involved in the adaptive management cases studied based the spatial scale of their interventions on existing biophysical and cultural-historic boundaries of area or clustered sub-areas, corresponding in some degree to a ‘regional identity’ (cf. aspect (7)). Expected mid-term and long-term effects of current land-use practices contributed to initiation of the cases studied. For example, effects on economic viability of land-use and about peat soil subsidence. These four cases included experimental practices that did not substantially change existing land-use practices, and in that sense, were not far-reaching. To experiment beyond the scope of existing practices – i.e. to experiment with land-use types in the areas in question – would have required involvement of both higher governmental bodies as well as cooperation of local groups at a larger institutional scope than those directly involved in case locations (cf. (6)). That would have been necessary to address issues reported in these four cases as: diffuse responsibilities for sustainable water management and land-use allocation between two different regional authorities (i.e. provinces and water boards);

unclear priority of European Union (EU) policies; granting of all required permits; and a lack of support by future boards designated to take over the administration of the project. The present study found that the cases studied lacked capacity to deal with such wider-scale institutional contexts, confirming the observation by Hahn et al. (2006) that this would merit further attention.

Observations in the empirical cases show that the spatial and institutional scale dimension of *transition management* in settings such as Dutch fen landscape may merit further research, confirming the point made by Foxon et al. (2009) and Smith et al. (2010). Although a significant number of issues were identified – such as changing EU policies on water and environmental management, and market and policy dynamics influencing the dairy sector – that related to the spatial scale dimension of the three transformation cases studied, the leading actors involved did not express how these could be dealt with by intended transformations (cf. (6)). The cases studied show that the intended transformations depended heavily on the implementation of technical spatial planning instruments to steer towards intended sustainability goals. In practice, however, these instruments have encountered serious complications or are expected to do so. Options for land exchange can be considered as limited, according to several actors and documentation consulted. Public opinion in two cases does not favour land exchange due to the legacy of a previous major land-exchange plan that has stagnated. The extremely high budget required for voluntary land acquisition is reported to be unavailable in these two cases. Expropriation of lands is increasingly preferred by implementers. However, national government stipulates that no more than 10% of such initiatives may be implemented by means of expropriation because of severe social consequences, which leaves 90% to be realised using other instruments (which have been observed to have various complications). Despite all these challenges, the leading actors in these cases did not consider it necessary to equip their interventions with ways to resolve or cope with these issues.

The issues in the academic debate on PES cannot be straightforwardly recognised in the PES cases studied. Most notable from the empirical cases, is that although the PES cases studied encountered a variety of temporal, spatial and institutional scale issues, they do not tend to develop or consider approaches to handling these issues. Scale issues encountered mostly relate to connecting spatial and temporal scales to financing issues, such as: expansion of a programme's spatial scale causing private fundraising to become too difficult; lack of a mechanism to create a new fund for spatial upscaling; and a lack of long-term contracts (cf. (7)). The findings indicate complications in reformulating agreements when initiators intend to increase the spatial or temporal scale of a programme. More research could be helpful in determining how to build in processes that anticipate and deal with changes in temporal and spatial scales.

3.5. Handling uncertainty

The way the literature discusses handling uncertainties in *adaptive management* can partly be recognised in the studied practices. Actors in the adaptive management cases studied did not explicitly acknowledge variability in biophysical and socio-economic processes (cf. aspect (8)). Three cases did include experimentation in management interventions in the field, with varying extents of lesson-learning (cf. (9)). However, disagreements about whether farmers should bear the brunt of production loss due to raised water table levels, or if nature conservationists should bear the brunt of habitat loss due to low water table levels – tended to limit the experimental scope. Actors involved in the fourth case intended to include experimental management relating to water

tables and peat soil preservation, but had to adjust that intention during the process as a result of the cumulative effects of high-level political and local social pressure, budgetary constraints and the planning procedure applied. Although experimental initiatives were intended to develop new ways to address fen management issues, in all four cases they appeared to encounter various limiting factors, before the experimental practices could actually get started. Considering these challenges, clarity on how to deal with conflicting interests and institutional complexity may assist adaptive management in moving toward sustainable development better than enhanced quantitative and detailed knowledge about the functioning of social-ecological system (cf. Smith and Stirling, 2010; Voss and Bornemann, 2011). This finding also confirms Lee (1999) observations that adaptive management “is difficult to initiate and to sustain” (art. 3, no page number). And it supports Lee (1999) proposition that it should be applied only after a collaborative structure and a shared agenda between involved groups has been established.

The observations in the *transition management* literature debate also largely apply to the empirical transformation cases. The explicit acknowledgement of uncertainties was not observed in the cases (cf. (8)). A few instances of specific attention to monitoring and evaluation can be found in the transformation cases studied (cf. (9)). In one case, an evaluation of intended goals occurs every two years in order to assess whether cooperation between governmental bodies involved is suitable and whether sufficient financial means are available. In another case there was an intention to develop a strategy for dealing with uncertainties and risks associated with political and administrative changes, financial and legal risks, and uncertainties – though this intention remained unrealised. Participants indicated that uncertainties, risks and unpredictable changes may influence further implementation of the intended transformations. Despite such uncertainties, leading actors in all three cases did not consider it necessary to equip the transformation plans with instruments designed to resolve or cope with issues of this kind. This confirms the observation made by various authors that transition management would benefit from more attention to normative and political aspects and transparency in organising learning and experimentation, monitoring and the selection of experiments (Van de Kerkhof and Wiczorek, 2005; Shove and Walker, 2007; Foxon et al., 2009; Meadowcroft, 2009; Voss et al., 2009; Voss and Bornemann, 2011).

Although the literature is addressing the handling uncertainties in PES schemes in several ways, the PES cases studied do not explicitly acknowledge uncertainties regarding for example stakeholder participation, biophysical contexts and potential for further development (cf. (8)). One case did take uncertainty as a starting point, and designed experimentation and lesson-drawing into the programme (cf. (9)). And whilst learning was not explicitly facilitated in the other PES cases studied, most of them do identify lessons learned, such as: that motivation and commitment are critical success factors; that an exceptional legal situation is possible with ‘regulated tolerance’ of processing of mown grass; and that raising funds for specific aims is more feasible than raising funds for general aims. In two cases, it was also observed that learning processes could be hindered by discontinuity of knowledge exchange. Overall, in comparison with the other earlier discussed four criteria, handling uncertainty issues does not appear to be as influencing in PES cases as attention to equity, democracy, legitimacy and handling scale issues does.

4. Discussion

Up till now, academic discourse has barely explored connecting ideas about inducing change intended to enhance sustainable

development, to ideas about what 'good' governance for sustainable development should look like. The study considers the value of multiple prominent criteria (i.e. equity, democracy, legitimacy, handling scale issues and handling uncertainty issues) in evaluating three prominent governance modes (i.e. adaptive management, transition management and payments for environmental services) in terms of their ambition to contribute to sustainable development. In doing so, the analysis includes an uncommon combination of a literature review and an empirical study to identify how these criteria are addressed in literature on these modes against experiences in practice when intervening in accordance to these modes. This study reveals that a broad evaluation perspective can help to understand problematic issues encountered in practices oriented towards enhancing sustainable development. It follows earlier made argument that sustainable development needs to be evaluated from a broader perspective (Adger et al., 2003; Biermann et al., 2010), and applied to empirical cases. The study provides an indication of the relevance of using such an evaluation perspective. It provides an evaluation perspective which can be used in other studies that seek to understand interventions orientated towards sustainable development.

The review of the literature on three modes studied, i.e. adaptive management, transition management and payments for environmental services, shows that aspects of equity and legitimacy receive least consideration. In terms of sustainable development as defined more than 25 years ago by WCED (1987), equity is considered an inherent and pivotal component. The three prominent modes studied here are oriented toward enhancing sustainable development. It is notable, then, that none of the respective debates studied, explicitly consider how cooperative learning-through-experimentation, innovation and transformation and stimulation of market mechanisms help to enhance equity.

Empirical analysis indicated that conflicting interests and land-use practices, as well as shared goals and priorities, influence the context of, and possibilities for, an initiative in a landscape such as Dutch fenlands. A lack of attention on addressing conflicting interests, differences in perceived fair and unfairness of decisions, conflicts about how advantageous and disadvantageous impacts should be distributed, and the capacity to explain decisions made, may impede consideration of solutions to such issues. Therefore more explicit attention to such aspects of equity and legitimacy is expected to be helpful in understanding how governance modes intended to move towards sustainable development are able to do so in practice (cf. Smith and Stirling, 2010; Voss and Bornemann, 2011; Cosens, 2013; Lundmark et al., 2014).

A wider perspective, including democracy, could also help in bringing recognition that not all actors are necessarily interested in joining an initiative and that not all leaders apply a broad invitation policy (cf. Meadowcroft, 2007; Hendriks, 2009; Pascual et al., 2010). Proponents of the three studied modes tend to base discussion on the notion that actors are willing to cooperate, whereas the studied empirical cases show that in all three modes this is far from obvious. In adaptive management, proponents usually assume that policy-makers, scientists and practitioners are invited and interested to cooperate. Transition management proponents typically assume that there are actors willing to develop innovative practices in niches, to participate in a transition-arena and to develop scenarios and pathways. Proponents of PES generally assume that there are actors willing to negotiate and fulfil their role as buyer or provider. However, the findings show that it is certainly not evident that: practitioners such as farmers and biodiversity conservationists are invited or willing to cooperate in adaptive management; municipalities are willing to cooperate in transition management; and sufficient buyers and providers are available to develop and establish PES schemes.

The three studied approaches (adaptive management, transition management and payments for environmental services) are mainly oriented towards the local and regional level as point of intervention. Adaptive management and payments for environment services appear to aim to operate quite independently from the wider scale institutional settings (e.g. national policy and regulatory frameworks, national and international market dynamics). The transition management discourse does aim to connect what is called the 'regime level' to the wider 'landscape level', although it is not explicit on how local initiatives can account for deeply embedded regulatory processes such as the Dutch water table decree and municipal zoning schemes. The findings show that local and regional locations are subject and part of wider institutional settings. The cases showed that experimentation with land-uses appears of limited potential in a dense institutional setting with a complicated rule making system, and with various conflicting ideas about what the problem is and about what is needed. Also, attempts to change or transform land use practices at local level, when change in a certain land use sector is mainly influenced by higher-level or even international dynamics, will face persistent complications. This makes attention to spatial and institutional scale issues also an important factor. The question that rises is whether these modes of steering are sufficiently able to induce change at a local or regional level, without explicit understanding of the wider institutional context. The relationship between the locally-oriented steering initiative and the existing institutional context merits further exploration and understanding (cf. Hahn et al., 2006; Meadowcroft, 2009; Clark and Clarke, 2011; Cosens, 2013; Chaffin et al., 2014).

Taking the literature and empirical analysis together, these findings indicate the importance of a more explicit inclusion of a broader range of criteria beyond just equity and legitimacy to also include democracy and handling of scale issues can help to understand the problems encountered in practice. The set of criteria as used here provides an example of how criteria which are predominantly studied individually to evaluate governance for sustainable development, can be studied together. Having observed that aspects of equity, democracy and legitimacy are interrelated – but have not yet been studied explicitly in relation to each other – these criteria may merit further research on how they relate to each other, and how they can be studied conceptually and in practice. Moreover, the study shows more understanding is needed of why actors in practice (apparently) give more attention to some criteria than others, whether there are active or implicit choices in giving attention to these criteria, and what the subsequent consequences (or trade-offs) may be for enhancing sustainable development (cf. Press, 1994; Jordan, 2008; Jordan et al., 2010; Hildingsson et al., 2012).

5. Conclusions

The main research aim of this paper is to enhance our understanding of governance for sustainable development, by assessing how prominent strategies for sustainable development address criteria of governance for sustainable development, both in literature and in practical interventions. The framework as proposed here with multiple evaluation criteria provides a way to do so. The empirical findings indicate that attention on these criteria may contribute to better problem-solving, in this case meaning enhancing sustainable development. In our analysis we have put more emphasis on the process dimension than on outcomes. Our findings indicate that without studying how ideas about inducing change relate to ideas about 'good' governance for sustainable development, struggles and limited problem-solving capacity of such modes may remain poorly or misunderstood.

In that way, the study confirms the value of a broad perspective in studying governance for sustainable development (Adger et al., 2003; Lafferty, 2004; Biermann et al., 2010). Our study further adds to this literature through demonstrating how a framework with multiple evaluation criteria may provide a way to bridge the debates about understanding inducing change and about evaluating 'good' governance for sustainable development. Most research oriented towards understanding several ways of inducing change towards sustainable development tend not to include and study ideas about what 'good' governance for sustainable development should look like. Whereas research on how to evaluate governance for sustainable development tends not to comparatively study different modes of change. As shown by the present study's findings, pivotal issues may surface when applying a perspective of multiple criteria and when studying empirical practices, which may go unnoticed when evaluating from the perspective of a mode itself or evaluating according to a more narrow perspective.

In conclusion, a multiple criteria framework is expected to advance our understanding of ideas about inducing change – such as adaptive management, transition management and payments for environmental services – in their capacity to contribute to their intended goal of sustainable development. Finally, the study shows that in order to advance our understanding of governance for sustainable development, it is essential to use a broad evaluation lens in studying empirical experiences, and to study the extent to which modes of inducing change, as discussed in the literature, reflect experiences and issues encountered in empirical practice.

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Appendix A. Literature review

Equity

Adaptive management

Given that adaptive management aims to enable a social-ecological system to continue for many generations, it seeks to achieve fair distribution of resources over time, and thus includes an equity component (cf. aspect (1)). Explicitly addressing equity issues is however only addressed by a few authors in adaptive management literature. Lee (1999) emphasises the need to acknowledge ethical concerns and to address conflicts between actors (cf. (2)). Hatfield-Dodds (2006) indicates that it is important for stakeholders in a particular ecosystem area to share financial burden (cf. (1)). McDougall et al. (2013) observe that adaptive collaborative forest governance may contribute to poverty alleviation (cf. (1)).

Transition management

Although the ambition of transition management to incorporate long-term sustainability goals and rights of future generations (Kemp et al., 2007) (cf. aspect (1)) may enable it to deal with equity aspects, equity is rarely related to transition management. Shove and Walker (2007) observe that discussions on transition

management give little attention to the question of who wins and who loses when transitions are guided in a specific direction (cf. (1)). Several propose that the transition management concept should better address the extent to which decisions on transitions are acceptable to affected groups and the general public (Hendriks, 2009; Meadowcroft, 2009; Smith and Kern, 2009; Voss et al., 2009; Smith and Stirling, 2010) (cf. (1) and (2)).

Payments for environmental services

Focus in PES literature on poverty alleviation clearly addresses distributional equity issues (e.g. Corbera et al., 2007; Kelsey Jack et al., 2008; Adhikari and Agrawal, 2013; McDermott et al., 2013) (cf. (1)). PES is proposed as a mechanism to increase fair distribution of financial resources (Grieg-Gran et al., 2005; Pagiola et al., 2010). By contrast, Kinzig et al. (2011) argue that poverty alleviation should not be addressed through PES schemes – it should rather be addressed directly. There are documented instances of programmes which may disadvantage landless people (Kerr, 2002; Satake et al., 2008) and poor people (Kerr, 2002; Grieg-Gran et al., 2005; Pagiola et al., 2010). Unintended distribution-related issues, including "land grabbing, insecure tenure, overlapping claims, and a lack of information on private tenure" have also been observed to occur in PES programmes (Borner et al., 2010, p. 1272). Discussion of economic efficiency addresses enhanced financial distribution in a few studies (Börner et al., 2010; Pascual et al., 2010). The aspect of unbiased decision-making does not seem to explicitly addressed (cf. (2)). Discussion on agri-environmental schemes also does not seem to address equity.

Democracy

Adaptive management

Although inclusion of multiple stakeholder groups (such as scientists, public officials, practitioners and other local stakeholders) is increasingly discussed in adaptive management literature (Lee, 1993; McLain and Lee, 1996; Jiggins and Röling, 2000; Olsson et al., 2004a, 2004b; Clark and Semmahasak, 2013), how to deal with participation of vulnerable groups in decision-making is articulated in only few studies (Smith and Stirling, 2010; Voss and Bornemann, 2011; Chaffin et al., 2014) (cf. aspect (1)). The main developers of the adaptive management concept emphasise collection of knowledge about a social-ecological system from local groups rather than participation of vulnerable groups in making strategic choices or in goal setting (Smith and Stirling, 2010; Voss and Bornemann, 2011; Chaffin et al., 2014) (cf. (2)).

Transition management

Many scholars (Shove and Walker, 2007; Foxon et al., 2009; Meadowcroft, 2009; Smith and Kern, 2009; Voss et al., 2009; Smith and Stirling, 2010; Voss and Bornemann, 2011) highlight that the transition management concept should give greater attention to how decision-makers for transitions represent public interests (cf. (1)). Because, firstly, attempting to stimulate transition in order to achieve a fundamental, structural – and therefore irreversible – shift in a socio-technological system affects large sectors of society. Secondly, they argue that the envisioned 'other state of the system' is not an objective state, but a normative construction, which should be decided upon with broad representation and collectively (cf. (1) and (2)). It has been furthermore proposed that there should be greater recognition of power imbalances among participating actors, especially between policy-makers and large corporate actors, and smaller civil groups or groups whose interests may run counter to mainstream policy or intended transformations (Van de Kerkhof and Wiczorek, 2005; Shove and Walker, 2007; Hendriks, 2009;

Voss et al., 2009; Smith and Stirling, 2010) (cf. (1)). However, positive reflections on transition management acknowledge its potential to incorporate participation of citizens and non-state stakeholder groups in development of transition pathways and innovations (Kemp and Martens, 2007; Grin et al., 2010) (cf. (2)).

Payments for environmental services

Understanding what influences participation and representation in design and decision-making of a PES scheme is included in a few studies on poverty alleviation and economic efficiency. Some studies observe that participation in PES design and decision-making may depend on power relations and leading group's invitation policy (Pascual et al., 2010) and may exclude most vulnerable and financially disadvantaged groups (Corbera et al., 2007; Bremer et al., 2014) (cf. (1)). Such aspects are however not addressed in the debate on agri-environmental schemes. Some researchers study participation in PES programmes from the perspective of what influences possible providers to participate in a running scheme to benefit nature conservation goals (Wilson, 1995; Wilson and Hart, 2000; Dobbs and Pretty, 2008) or livelihoods (Kerr, 2002; Grieg-Gran et al., 2005; Pagiola et al., 2010) rather than what influences participation in development, decision-making and evaluation of a scheme (cf. (2)).

Legitimacy

Adaptive management

Legitimacy of decisions made for adaptive management is mentioned since recently in adaptive management literature (Cosens, 2013; Plummer et al., 2013; Chaffin et al., 2014; Lundmark et al., 2014) (cf. aspect (5)). Plummer et al. (2013) find that legitimacy has been addressed in adaptive (co-)management literature in various ways – and that literature could even contribute to understanding legitimacy as an environmental governance challenge. By contrast, Lundmark et al. (2014) find that adaptive (co-)management literature has insufficiently acknowledged and studied concept of legitimacy, and propose adaptive (co-)management outcomes and legitimacy maybe highly related.

Transition management

Legitimacy is not addressed by transition management proponents, but it is identified as important by several critics of this mode. These scholars argue firstly, that it is necessary to clearly identify who actual decision-makers are or should be in a transition management process, otherwise they cannot be held accountable (Shove and Walker, 2007; Hendriks, 2009; Voss et al., 2009; Smith and Stirling, 2010) (cf. (5)). Secondly, they argue that it should be clear how a decision-making process for transition management relates to formal and everyday public policy processes (Shove and Walker, 2007; Hendriks, 2009; Meadowcroft, 2009; Voss et al., 2009; Smith and Stirling, 2010).

Payments for environmental services

Understanding capacity to explain and justify decisions made in the context of PES schemes seems to be increasingly picked up by this literature (Glicksman and Kaime, 2013; Vatn and Vedeld, 2013; Nicolaus and Jetzkowitz, 2014) (cf. (5)). Some authors find that US and EU governments have insufficiently addressed “the regulatory framework that governs ecosystem services” which may risk market manipulation and fraud (Glicksman and Kaime, 2013, p. 259), and argue for more explicit governmental involvement to enable accountable (and eventually more effective) natural resource management (Vatn and Vedeld, 2013).

Handling scale

Adaptive management

Strong consideration in adaptive management literature is given to suitability of spatial and temporal scales of experimental interventions (cf. aspect (6)). Typically, long-term temporal scale is proposed (Lee, 1993; Pulwarty and Melis, 2001). Spatial boundaries tend to be considered as identifiable whereby some authors propose that adaptive management is appropriate at small spatial scales and others recommend its use at large spatial scales (Walters, 1986; Lee, 1993; Gunderson, 1999; Roe and Van Eeten, 2002). The coupled nature of social and ecological systems as a key starting point for adaptive management (Berkes et al., 2003) leads to a preferred focus on bioregional scale (Huiteima et al., 2009; Chaffin et al., 2014) (cf. (7)). Some researchers argue that the need to align institutional scale and environmental issues in adaptive management calls for polycentric, flexible and responsive institutional settings with a high degree of diversity and redundancy (Folke et al., 2005; Olsson et al., 2006; Brunner, 2010; Chaffin et al., 2014) (cf. (7)). However, the question of dealing with higher and multiple institutional levels in relation to a bioregional context has been relatively less explicitly addressed (Hahn et al., 2006) (cf. (7)). It would therefore be interesting to further investigate how adaptive management could relate to higher or wider institutional levels (e.g. national policy-making) (Chaffin et al., 2014). Some exploration of this may be seen in attempts to connect adaptive management to the multi-level elements of transition management (e.g. Van der Brugge and Van Raak, 2007) (cf. (6)). Clark and Clarke (2011) address the relationship between local adaptive management initiatives for sustainability and higher-level policies and regulation (cf. (6)).

Transition management

Transition management literature focuses on handling of scale issues in the sense of dynamics among ‘functional levels’ – i.e. niche, regime and landscape (Rotmans et al., 2001; Kemp et al., 2007; Grin et al., 2010) (cf. (6)). Transition management attempts to deal with scale issues by finding connections between niches, regimes and landscapes and, by finding ways to diffuse local experiments from niches to dominant regimes (Foxon et al., 2009). While time scales and functional scales are central considerations in transition management literature (Rotmans et al., 2001; Kemp et al., 2007; Grin et al., 2010), spatial scale is observed as a point not yet addressed in transition management literature (Foxon et al., 2009; Smith et al., 2010). Foxon et al. (2009) observe that transition management is generally discussed in context of industry, technology and sectors such as energy, water and waste management, though rarely in context of a spatial scale. Smith et al. (2010) stress need for more research on transition management and spatial scale, and indicate that further understanding is needed of the relationship among these ‘levels of transition’ and other kinds of scale levels such as geographical, administrative, and network-related. The transition management concept is also not yet linked in the literature to biophysical or ecological dimensions (cf. (7)).

Payments for environmental services

Spatial boundaries and temporal constraints are typically discussed features of a PES programme (e.g. Kleijn and Sutherland, 2003; Dobbs and Pretty, 2008; Wunder et al., 2008) (cf. (6)). Discussion on targeting areas of land considered appropriate for conservation objectives refers to spatial scale issues and connecting schemes to biophysical assets (e.g. Van der Horst, 2007; Merckx et al., 2009) (cf. (6) and (7)). Institutional scale aspects, in terms of connecting buyers and providers, for example through intermediary organisations, is a further key issue in the PES discourse (e.g. Engel

et al., 2008; Wunder et al., 2008; Vatn, 2010) (cf. (6)). In contrast, linking multiple (i.e. spatial, temporal, institutional and biophysical) and cross-scale aspects is not central to PES literature (cf. (6)). It is studied though by Satake et al. (2008), who identify PES as a strategy to correct for damage caused by activities at a local scale, such as clearing land and burning fossil fuel and by phenomena that become manifest at a larger scale, such as global warming and biodiversity loss. Whilst Kinzig et al. (2011) argue that cross-scale issues such as how cross-country payments relate to payments within a country should receive greater attention in studying PES.

Handling uncertainty

Adaptive management

Handling of uncertainty issues serves as one of the starting points of the adaptive management concept. Scholars emphasise importance of anticipating unknown interactions and responses in a social-ecological system (Gunderson and Light, 2006; Lebel et al., 2006; Cooney and Lang, 2007) (cf. aspect (8)). Adaptive management emphasises redundancy and variability in practices to reduce vulnerability to unknown impacts (Berkes et al., 2003) (cf. (8)). Adaptive management literature typically includes discussion on knowledge management (Jiggins and Röling, 2000; Henriksen and Barlebo, 2008); social learning (i.e. developing shared understandings, meanings and practices within a social entity as a whole) (McLain and Lee, 1996; Pahl-Wostl et al., 2007); promotion of learning in policymaking processes (Huntjens et al., 2011); use of local knowledge in decision-making (Olsson and Folke, 2001; Klooster, 2002; Olsson et al., 2004a, 2004b); and experimentation and learning (Johnson, 1999; Gunderson and Light, 2006; Foxon et al., 2009; Voss and Bornemann, 2011) (cf. (9)). It however does not address how to take a learning-by-doing approach in a context of contested uncertainties and institutional complexities (cf. Lee, 1999; Meadowcroft, 2007). Here, it is also relevant to note that Armitage et al. (2008) articulated that exchange of knowledge should not be advocated unconditionally, and that attention must be given to aspects such as recognition of risk and power relations in evaluation and storage of information.

Transition management

Rotmans and Van Asselt – authors of the paper which coined transition management in 2001 – have also explicitly studied uncertainties; they did so by reflecting on and proposing different sources of uncertainties (i.e. uncertainties due to variability and due to lack of knowledge) (Van Asselt and Rotmans, 2002). Yet, acknowledgement of uncertainties (related to variability) does not seem to feature in the transition management literature (cf. (8)). Primary goal of learning and experimentation in transition management is to stimulate innovation and subsequently change (Rotmans et al., 2001; Kemp et al., 2007; Grin et al., 2010; Smith and Stirling, 2010; Voss and Bornemann, 2011) – which may also contribute to dealing with uncertainties due to limited knowledge (cf. (9)). Several critics observe that the transition management concept is too vague in dealing with normative and political aspects and transparency in organising learning and experimentation, monitoring and selection of experiments (Van de Kerkhof and Wiczorek, 2005; Shove and Walker, 2007; Foxon et al., 2009; Meadowcroft, 2009; Voss et al., 2009; Voss and Bornemann, 2011) (cf. (9)).

Payments for environmental services

In terms of explicitly acknowledging uncertainties, some authors have recently started to study uncertainties in PES in different respects. Derissen and Quaas (2013) study the role of environmental uncertainties in the functioning of PES, Lennox et al. (2013) the meaning of uncertainties in economic transactions for landowners,

and Ruckelshaus et al. (2013) the challenge to communicate uncertainty in useful and transparent ways when studying and feeding into PES schemes (cf. (8)). Using newly gained insights and monitoring to improve ecological effectiveness is an important element in PES debate on agri-environmental schemes (e.g. Kleijn et al., 2001; Kleijn and Sutherland, 2003; Swagemakers et al., 2009) (cf. (9)). It is addressed by only a few studies in the debate on poverty alleviation (Holguin et al., 2007; Petheram and Campbell, 2010), and even absent in debate on economic efficiency (cf. (9)). Holguin et al. (2007) conclude that farmers' training and participation and technical assistance is effective in a large-scale experimental PES programme to combine forestry and grazing of domesticated animals. Petheram and Campbell (2010) observe that in order to increase poor people's participation in PES schemes, potential providers' context should be thoroughly researched, qualitative research and participatory tools should be used to design a scheme and a mutual learning process should be facilitated among involved groups.

Appendix B. Empirical setting and findings

Dutch fen landscape

An environment heavily shaped by human activity, the Dutch fen landscape is a prime example of a multi-actor, multi-sector and multi-level challenge with a biophysical and socio-economic situation characterised by complexities and uncertainties. The landscape is characterised by high population density, intensive economic usage, high pressure on spatial usage and natural resources, conflicting claims by involved groups and involvement of numerous governmental bodies (Den Uyl and Wassen, 2013). The sustainability challenge of this landscape affects public and private stakeholders at local and regional scale, includes a complicated technical assignment for water management, and involves several types of land-uses. Actor groups active in the Dutch fen landscape include local, regional and national governments, farmers, nature conservationists, residential groups, recreationists, landscape conservationists and scientists. The Dutch fen landscape comprises a western and a northern peatland area (approximately 223,000 ha in total) and is mainly used for grassland farming. In this landscape, several natural resources and ecosystem services (e.g. peat soil, water quality and biodiversity) are under pressure, and economic viability of grassland farming is under discussion.

A fen is a peat soil lowland landscape and usually groundwater fed. Peat soil is accumulated organic matter from remains of vegetation, naturally wet and susceptible to drainage. When drained, peat soils oxidize, mineralize and subside. As natural peat accumulation is a slow process (about 1 mm/year), loss of peat soil is extremely difficult, if not impossible, to reverse. Water tables have been and continue to be artificially drained to create land for mostly agricultural and residential purposes. Maintenance of the resulting cultural-historic open meadow landscape requires at least slight drainage. In long term, however, this contributes to peat-soil subsidence and impedes conservation of species-rich fen habitat. At the same time, this cultural-historic landscape is valued by many groups (including residents and recreationists), has an official preservation status in some locations and provides habitat for fen meadow species such as wading birds. Multiple uses and functions involved make water management pivotal to planning and usage of fen landscapes. The sustainability challenge in this landscape is further characterised by uncertainties regarding relationships between farming and nature conservation, water management and peat-soil preservation and market dynamics and dairy farming.

Frequently conflicting interests of actors involved together with changing processes in the biophysical setting make this landscape an unsettled environment. Groups involved have expressed

multiple concerns about the future of this landscape. The discussion so far about the future of these landscapes tends strongly to converge on water management (pivotal in planning and usage of such landscapes) and to take place at local scale. The settings and challenges in this landscape may also serve as forerunner examples for other locations worldwide where similar intensification of rural and natural areas is expected.

In this landscape, three prominent modes of governance for sustainable development can be identified in empirical cases, thereby enabling them to be comparatively studied (Den Uyl, 2014). The studied setting yields fifteen cases in particular in which (one of the) three studied modes can be recognised. The sections below elaborate on the practical experiences in these cases, Table 3 provides some general information.

Adaptive management cases

The four adaptive management cases studied were selected based on their explicit orientation toward learning-by-doing, cooperation and experimental management. In these four cases, the adaptive management process was considered necessary because various, often conflicting, claims were imposed on the area in question, bio-physical and socio-economic issues had become increasingly complex, uncertainties had mounted, and initiating groups expected that a cooperative learning-by-doing approach would assist in solving sustainability issues. One case enabled a transparent design process with a high degree of non-state stakeholder input; the other three included some stakeholder input and joint decision-making. Although the cases studied included local civic knowledge in designing the intervention scheme, none did so explicitly in subsequent decision-making. Monitoring, evaluating, lesson-learning (e.g. on water table management, fertilisation and peat decomposition) and exchanging lessons-learned were facilitated in implementation phases of cases studied. Monitoring and evaluation of planned measures was expected to occur mid-term, although the possibility of changing budgetary constraints and policy priorities meant that this could not be guaranteed. Learning was however not explicitly promoted about the decision-making processes.

In the cases of Polder Mastenbroek and Zegveld/Oud-Kamerik, the actors involved struggled with renewal of water table decrees, mainly due to challenges presented by conflicting claims on water table from agricultural groups and nature conservation groups. This led the leading actors in these two cases to apply innovative, participatory processes and experimental water table regimes. In the case of Wormer- and Jisperwater, the actors involved struggled with deteriorating water-quality, relatively high slurry production and decomposition of peat soil. Cooperation among the water board, a nature conservation NGO, the province and the municipality has led to an adaptive learning process about experimental water and soil management. A few farmers participate in this experimental process, although support from farmer groups in the area was generally low. Local residential groups were active, and demanded priority of dredging near their houses.

The initiative in the case of Toekomst Amstelland was prompted by vulnerability of the agricultural economy of that area and a strong demand for more recreational options from a nearby urban area. In this case, a transparent and highly participatory process was applied with the initial ambition to develop new, experimental landscape management concepts. Actors involved in Toekomst Amstelland intended to include experimental management relating to water tables and peat soil preservation, but had to adjust that intention during the process as result from cumulative effects of high-level political and local social pressure, budgetary constraints and planning procedure applied. Although the cases studied included local civic knowledge in designing the intervention scheme, none did so

explicitly in subsequent decision-making. Toekomst Amstelland enabled a transparent design process with a high degree of non-state stakeholder input; Polder Mastenbroek, Wormer- and Jisperwater and Zegveld/Oud-Kamerik included some stakeholder input and joint decision-making. Uncertainty was also reported in the cases studied about whether some actors involved would continue to be interested to cooperate. Actors consulted identified several issues relating to such participation, including a strong agricultural lobby that was able to obstruct implementation process in Polder Mastenbroek and Zegveld/Oud-Kamerik, and uncertainty over whether farmers would cooperate in field experiments in Wormer- and Jisperwater. While consensus-building among a selection of involved parties was addressed in Polder Mastenbroek, Wormer- and Jisperwater and Zegveld/Oud-Kamerik, these three cases involved no explicit attention for unbiased decision-making or for wider acceptance of intended interventions. At the same time, issues arose when decisions were needed about who would profit from an experiment and who would not, and certain decisions were publicly disputed. Actors consulted in Polder Mastenbroek, Toekomst Amstelland and Zegveld/Oud-Kamerik emphasised necessity of an experienced team and professional process guidance to be able to deal with uncertainties and complexities in decision-making process. In the cases Wormer- and Jisperwater and Zegveld/Oud-Kamerik, some proposed that capacity to explain and justify decisions made could be increased by reducing administrative uncertainties, increasing more effective governmental coordination and ensuring a clear division of responsibilities.

Transition management cases

The three transition management cases were included because they were explicitly oriented toward transformation of current land-uses, including transformation of relatively large parts with dairy farming to other land uses. Transformations were initiated and steered by the regional authority (province of Zuid-Holland). The case of Gouwe Wiericke initially concerned a plan to transform dairy farming in the whole area, and was intended to be approved by many local actors. After various struggles, the area was divided into five sub-areas, including some adaptation areas and some transformation areas, which are currently in various stages of implementation. The case of Groenblauwe Slinger concerned an area surrounded by urban development and facing increasing demand for recreational options. When this initiative started, it mainly featured dairy farming and glasshouse horticulture. It also identified five sub-areas, including adaptation and transformation areas. In the transformation areas, glasshouse horticulture has been removed to other locations, allowing these areas to be transformed to fen-meadow and wet-fen conservation areas with facilities for recreation and water storage. At time of writing, Groenblauwe Slinger was in a relatively advanced stage of implementation. In the case of Krimpenerwaard, a plan was developed to transform a cultural-historic grassland farming area into zones with nature conservation and agricultural usage. Many parties, including governmental bodies and various interest groups signed an agreement on this plan. At time of writing, various measures were in different stages of implementation.

In Gouwe Wiericke an evaluation of intended goals occurs every two years in order to assess whether cooperation between governmental bodies involved is suitable and whether sufficient financial means are available. In Groenblauwe Slinger the intention was to develop a strategy for dealing with uncertainties and risks associated with political and administrative changes, financial and legal risks, and uncertainties. It seems, however, that this intention has not become reality. In these three cases, some small-scale innovative practices have been stimulated. These include a new type of farming in Krimpenerwaard referred to as a pilot, and one of

the transformation sub-areas in Groenblauwe Slinger is regarded as a pilot (by internal as well as external actors). All three cases did not include elaborate facilities to enable learning or exchange of insights. In each case, input from non-governmental groups was considered by the leading actors, indicating some degree of representation. Although development of and selection from alternatives was approached in all three cases as a technical issue rather than as a normative, political and mutual decision-making process. Overall, the degree of participation of non-state actors in plan and decision-making was not high.

Participants indicated that various challenges may influence further implementation of the intended transformations. In Groenblauwe Slinger, the Public Bureau of Rural Affairs indicated that relatively major dependency on land acquisition creates uncertainties for implementation when available budgets change. In Krimpenerwaard, the Public Bureau of Rural Affairs reported uncertainty about willingness of some parties to cooperate with implementation. In Gouwe Wiericke and Krimpenerwaard, protests from multiple affected groups, general public protests, lack of public acceptance, and no support from several local authorities indicated widespread questioning of whether the decision-makers were able to explain and justify the decisions and proposed interventions. In Groenblauwe Slinger, the leading actor assessed trust relations with societal groups as generally neutral, while a local nature conservation interest group reported trust in the leading actor to take decisions in a transparent way to be extremely low. The municipalities in Gouwe Wiericke and Krimpenerwaard – in charge of translating intended transformations plans into legally binding zoning schemes – did not tend to agree to targets set by the regional authority; instead, they were inclined to support local stakeholder interests. In addition, plan-making and implementation processes were indicated (in all three cases) to have to deal with supra-regional market dynamics affecting plot prices. These market dynamics in the dairy sector largely depend on (expectations of) liberalisation of EU agricultural policies, national policies affecting dairy sector, fluctuations in milk prices, world market position of food production, and development of production methods.

The Dutch fen landscape is characterised by intensive land-use, a variety of actors claiming spatial domain (i.e. farmers, nature conservationists, recreationists and residents), several governmental bodies with responsibility for a task in the landscape (e.g. through regional authority's nature conservation policy, water board's flood protection measures and municipalities serving local communities) and a complex formal procedure for establishing regional and local spatial zoning schemes (i.e. regular – and problematic – renewal every 30 years). It is the combination of these factors and the resulting 'regime' that makes experimenting with the spatial structure almost impossible.

Payments for environmental services cases

The study included all eight PES cases operational in Dutch fen landscapes. Following introduction of the Dutch agri-environmental scheme (SAN) in 2000, seven other PES programmes were introduced or continued. The SAN programme is the largest of the eight PES cases investigated and imposes formal conditions on how other schemes operate. The seven additional programmes were launched for various purposes. Such as SAN was considered to be insufficiently effective in protecting meadow-bird populations (in the case of Nederland-Gruttoland) and for not providing payments for specific landscape and water management practices (in the cases of Waterland, Eem & Vallei, Midden-Delfland, Alblasserwaard, Naobers van Zudert). Although cases differ widely in terms of their participants, it is evident that public

bodies are principal buyers, and dairy farmers are principal providers.

At time of writing, the SAN programme sees participation of some 5738 dairy farmers located in the fen landscape. In 2007, SAN was restructured from a nationally-coordinated programme into a regional programme. It should be noted that in June 2013 Dutch government discussed plans including a proposal to cancel or drastically reform this programme, on grounds that some aspects of its goals are unclear (Ministry of Economic Affairs, 2013). The Nederland-Gruttoland programme also operates at national scale. Initially, in 2003, this scheme was mainly financed through private buyers, but switched in 2006 to public buyers. In Nederland-Gruttoland, lack of insight about fen meadow management was one of the starting points, in particular lack of insight in preserving the Black-tailed Godwit. It designed experimentation and lesson-drawing into the programme. In this programme it was identified that a group approach may be more effective than an individual approach in enabling learning about programme. After evaluating its results, the programme has postponed mowing until later in spring and spatially enlarged undisturbed breeding space at all locations in programme in order to improve breeding success of meadow birds.

The Waterland, Eem & Vallei, Midden-Delfland and Alblasserwaard programmes each operate (at regional scale) in a specific area. The Eem & Vallei programme operates in an area with a 'national landscape' policy status (Arkenheer-Eemland). The Midden-Delfland programme is situated near urban areas and was initiated by municipalities. The leader is an NGO created to coordinate and implement programme, with representatives of three municipalities sitting on its board. Implementation of the Midden-Delfland programme is assisted by a local agri-environmental association. A public landscape fund was established to implement the Alblasserwaard programme (situated in the Alblasserwaard-Vijfheerenlanden area), which also leads this scheme together with the buyers. The Biesland and Naobers van Zudert programmes operate at local scale. Biesland is located near a city. The provider is one single, large, biodiversity-oriented farm. There is no officially designated leader in this case; the provider is in practice the leader. The alternative financial arrangement developed for this case was approved by European Commission for ten-year implementation. The Naobers van Zudert programme is implemented and coordinated by a landscape fund which was established by local residents and reed cultivators.

In some cases, there were some issues related to the ability of decision-makers to explain and justify their decisions. These include a legal conflict between farmers and biodiversity conservationists about a decision on mowing schedules and protection of chicks in fen meadows in the case Nederland-Gruttoland and objections by participants to high level government decisions on grounds that they are highly unfair and unjust in the cases Biesland and Midden-Delfland. There were several scale issues encountered in these PES cases, such as: expansion of a programme's spatial scale causing private fundraising to become too difficult; lack of a mechanism to create a new fund for spatial upscaling; and a lack of long-term contracts. The findings indicate a trade-off between long-term static schemes and short-term flexible schemes: providers and intermediaries in one case (SAN) which includes 5–7 year contracts, have demanded a mechanism to enable customisation and shortening of contracts, whereas providers and intermediaries of one-year-contract case (NLGL) have demanded long-term commitment. One case (BL) illustrates the possibility of a long-term (i.e. 30-year) commitment. The present study showed that it is complicated to reformulate agreements when initiators intend to increase the spatial scale of a programme, and that it is difficult to extend agreements between current buyers and providers to long-term payments and provisions.

Table 3
General information on adaptive management cases studied.

| Adaptive management cases | Main aim | Main actors involved | Duration (start-planned end date) | Plan-making phase | Size of project area |
|-----------------------------|---|--|-----------------------------------|--------------------------------------|---|
| Polder Mastenbroek | <ul style="list-style-type: none"> - To update water level decree; - And learn more about suitable water tables to facilitate different land-use functions in area (different nature conservation uses, different agricultural uses). | <ul style="list-style-type: none"> - Water board (decision-making actor); - Agricultural group and nature conservation group (representing interests and affected by implementation); - Consultancy assisted in identifying possible water table regimes and accompanying effects; - Consultancy experienced in agricultural issues supported plan-making phase and negotiated with local farmers. | 2001 – not available | 7 years | 8350 ha |
| Toekomst Amstelland | <ul style="list-style-type: none"> - Initially to develop new landscape management concepts, and experiment with water tables and new types of land-use practice; - Later aim was adjusted to implementation of a set of selected measures. | <ul style="list-style-type: none"> - Six municipalities (decision-making actors); - water board and province (sideways involved in plan-making); - range of local agricultural, residential and biodiversity conservation groups (representing interests and affected by implementation); - small consultancy supported and coordinated plan-making process. | 2002–2033 | 2 years | 3500 ha |
| Wormer- & Jisperwater | <ul style="list-style-type: none"> - To organize more sustainable water system, and reduction of peat decomposition and slurry production by improving water quality; - and learn about relationship between fertilization, soil and water management in fen meadow areas. | <ul style="list-style-type: none"> - Water board (decision-making actor); - Nature conservation NGO, a municipality, province, and a process coordinating consultancy (all involved in plan-making); - Residential group (representing interests and affected by implementation); - semi-academic consultancy involved in monitoring and evaluation. | 2000–2010/2015 | 6 years | 2400 ha |
| Zegveld/Oud-Kamerik | <ul style="list-style-type: none"> - To update water level decree and develop new way to update expired water-level decree; - And enhance social support for an updated water table decree and create more sustainable water system. | <ul style="list-style-type: none"> - Water board (decision-making actor); - Consultancy assisted in developing and identifying possible water table regimes; - University-affiliated organizations advised on possible impacts on agricultural practices; - During plan-making stage, a consultant supported process and negotiated with farmers and residents; - Agricultural group and nature conservation NGO (representing interests and affected by implementation). | 2003–2009 and beyond | 3 years | 2700 ha |
| Transition management cases | Main aim | Main actors involved | Duration (start-planned end date) | Plan-making phase | Size of project area |
| Gouwe Wiericke | <ul style="list-style-type: none"> - Initial ambition was to realise transformation for whole area (similar to Krimpenerwaard); - Eventually, aims were to increase climate change resilience through more sustainable water and soil management system, improve fen nature conservation; enhance economic viability of agriculture, conserve cultural-historic valuable landscapes and develop economic viable recreation options. | <ul style="list-style-type: none"> - Province (decision-maker); - Five municipalities and two water boards (closely involved in plan-making process and in decision-making); - Four agricultural interest groups, five nature and landscape conservation groups, and a cultural-historic group (in advisory position); - Public Bureau of Rural Affairs (involved in implementation). | 2006–2014/2018/not yet known* | 4 years | Size unknown; 1400 ha reserved for new nature conservation area. |
| Groenblauwe Slinger | <ul style="list-style-type: none"> - To develop nature conservation areas, enhance agricultural landscape and recreation facilities, and create and improve water storage facilities. | <ul style="list-style-type: none"> - Province (decision-maker); - Several municipalities (affected by and involved in plan-making and implementation); - Several agricultural and nature conservation groups (representing interests and affected by implementation); - Public Bureau of Rural Affairs (involved in implementation). | 1993/1994–2013/2015* | 5/11 years* | Adaptation areas: 20.000 ha. (1600 ha new nature). Transformation areas: +/- 1190 ha. |
| Krimpenerwaard | <ul style="list-style-type: none"> - To transform area into three zones, with: nature conservation; viable agriculture combined with fen meadow conservation; and with production agriculture with a relatively deeper drainage. | <ul style="list-style-type: none"> - Province (decision-maker); - Several municipalities (affected by and involved in plan-making and implementation); - Several agricultural and nature conservation groups (representing interests and affected by implementation); | 1999/2005–2021 | 1/6 years (depending starting point) | 13.500 ha. (2450 ha new nature) |

Table 3 (continued)

| Adaptive management cases | Main aim | Main actors involved | Duration (start-planned end date) | Plan-making phase | Size of project area |
|---|--|---|--|--|---------------------------------------|
| - Public bureau for implementation of rural affairs (involved in implementation). | | | | | |
| PES cases | Main aim | Main actors involved | Duration (since start payments) | Contract periods | Size of project area |
| Subsidieregeling Agrarisch Natuurbeheer (SAN) | To enhance landscape and biodiversity conservation and water regulation. | <ul style="list-style-type: none"> - National government (ministry) (buyer and initiator); - Province (intermediary organisation); - Agri-environmental associations (intermediary organisation); - Farmers (providers). | Current structure since 2000 (earlier structures date back to mid-1980s) | 5-7 year contracts; how to continue under discussion | ≈ 64,306 ha |
| Nederland-Gruttoland | To enhance biodiversity conservation (especially wading birds) and water regulation. | <ul style="list-style-type: none"> - A lottery and national government (ministry) (buyers); - Three NGOs, an agri-environmental NGO, nature conservation NGO and landscape conservation NGO (initiators); - Coordinating organisation (intermediary); - Farmers (providers). | 1st phase 2003–2005. 2nd phase 2006 and beyond. | 1 year contracts, planned to be continued | ≈ 751 ha |
| Waterland | To enhance biodiversity conservation, landscape conservation and water regulation. | <ul style="list-style-type: none"> - Municipalities and water board (buyers); - Agri-environmental association (initiator and intermediary) - Farmers (providers) | Since 1997 | Ad hoc contracts, planned to be continued | ≈ 13 ha |
| Eem & Vallei | To enhance biodiversity and landscape conservation. | <ul style="list-style-type: none"> - Buyers are a mixture of local and national companies (45%), municipalities, province, national government (45%) and private individuals (10%); - Local public-private landscape fund (intermediary); - About ten dairy farmers (providers). | Since 2003 | Ad hoc | Scattered plots in area of ≈ 8500 ha. |
| Midden-Delfland | To enhance biodiversity and landscape conservation. | <ul style="list-style-type: none"> - Three municipalities and some local companies (buyers); - A local fund (intermediary); - Agri-environmental association (intermediary); - Farmers and some residents (providers). | Since 2006/2007 until 2012+ | 6-year contracts, planned to be continued | ≈ 1500 ha |
| Alblasserwaard | To biodiversity conservation and landscape conservation. | <ul style="list-style-type: none"> - Water board and Public Bureau of Rural Affairs (buyers); - Local public landscape fund (intermediary); - Farmers and residents (providers). | Since 2005 | Ad hoc contracts, planned to be continued | ≈ 5 ha |
| Biesland | To enhance biodiversity, landscape and soil conservation, and water regulation. | <ul style="list-style-type: none"> - National government, province, water board and four nearby municipalities (buyers); - Local fund (intermediary); - One farmer (provider); - Semi-academic research organisation (contributed in developing concept and is involved in monitoring and evaluation) | Since 2008 until 2028/2038+ | 20-30 year contract | ≈ 95 ha |
| Naobers van Zudert | To enhance biodiversity and landscape conservation, and water regulation. | <ul style="list-style-type: none"> - Mix of buyers in 1st phase (national company, private fund, local residents, nature conservation NGO, ministry, province); - In 2nd phase, buyers included: province, and other various ad-hoc buyers of products resulting from environmental services in area; - Local public-private landscape fund (intermediary); - Local households (providers). | 1st phase 2005–2007. 2nd phase 2008+ | Ad hoc contracts, planned to be continued | ≈ 5 ha |

Source: Den Uyl (2014).

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