CASE STUDY

PAYMENT FOR ECOSYSTEM SERVICES (PES) IN SUPPORT OF RIVER RESTORATION

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A river basin can be viewed as an ecosystem that provides services for the benefit of society. Changes in the ecosystem, for example following river restoration, may lead to changes in its services. This will have negative or positive consequences for stakeholders; in other words: they face changes in costs or benefits. This is the basic notion of the concept of "ecosystem services". Payment for ecosystem services (PES) might be a solution to balance costs and benefits.

This paper reports preliminary findings from a pilot study that will be finished by the end of 2013 and was preceded by a pilot study in 2011 that pointed out that especially the involved water managers see potential added value of an ecosystem services approach. The approach may help them to find: (a) better integrated solutions to the problems in the area, (b) new funding opportunities for measures and (c) more acceptance and support by land owners and the public for these measures[1].

If stakeholders engage voluntarily in a negotiated agreement (e.g. taking the form of a contract) to balance costs and benefits, this is called a 'Payment for Ecosystem services (PES) scheme'.
The United Nations Economic Commission for Europe (UNECE) has provided recommendations for PES implementation in water management[2]. However, there is a lack of practical experience on how this approach can support water management.

The aim of our current pilot study is to assess the practical applicability and added value of an ecosystem services approach in regional, trans-boundary water management. There was a special interest to explore the potential of PES to support river restoration. The project is running in parallel to a regional planning process for river restoration. This project is financed by the Dutch Ministerie voor Infrastructuur & Milieu and the German Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit, as part of their activities in the context of the Transboundary Water Convention – (UNECE). Further financial support is provided by the Niedersächsisches Ministerium für Umwelt, Energie und Klimaschutz.

Regional challenges in the Vecht river basin

The study area covers a 20 km stretch (ca. 1000 ha, see Fig. 1) of the Vecht river basin between Emlichheim

Fig. 1. The study area covers the part of the Vecht river basin between Emlichheim (DE) and Hardenberg (NL). Source of the map: Wikipedia.

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PAYMENT FOR ECOSYSTEM SERVICES: BENEFICIARY PAYS

Payment for Ecosystem Services (PES) is an instrument to balance the interests of (a) parties (e.g. land owners) who need to invest in order to preserve or enhance ecosystem services and (b) the beneficiaries of these services.
In most cases the party that preserves or enhances ecosystem services is not being paid for a specific ecosystem service (output) but for a specific land use (input) that should contribute to the desired ecosystem services. For example, a land owner is being paid for the plantation of a certain number of trees instead of being paid for a specific amount of ecosystem services those trees deliver (such as air quality regulation).
Payments can be user-financed or financed by others (mostly government) on behalf of users. The Dutch system of Green and Blue services (In Dutch: Groene en Blauwe diensten) is an example of such a PES system: farmers are being paid by a public body for specific land use practices or maintenance works that are beneficial to ecosystem services such as habitat connectivity, and water purification.
The payment can be a fixed price such as a national fixed price for delivery of a certain amount of services or the price is determined case-specific because the value of ecosystem services is context dependent. Besides payment in cash, discounts on taxes or other benefits may be the currency for payment.
Some specialists state (e.g. at the Ecosystem Services Partnership Conference – 2013) that the focus of payment for ecosystem services should be more on co-investments of the beneficiaries instead of compensation for costs only.
[This information is based on several sources [3, 4, 5, 6]]

(Germany) and Hardenberg (the Netherlands). Water managers from both countries are planning river restoration measures in this area as part of a larger program of measures to create a more natural river (Vecht Vision[7]). Furthermore, municipalities in the region want to increase tourism to improve the regional economy and to maintain facilities that are important to residents.

A stepwise exploration of imbalances in costs and benefits of floodplain restoration

PES may be a solution to overcome imbalances in costs and benefits of a planned measure. To assess the potential of PES to support implementation of water management measures arising from the trans-boundary Vecht Vision, floodplain restoration as specifically planned measure for river restoration was selected. For this measure, the positive (*benefits*) and negative effects (*costs*) on different stakeholders were identified, as well as the links between these costs and benefits and potential imbalances. The steps of the assessment are described in more detail in the next sections.

Step 1 Selection of a detailed draft design for the measure

Floodplain restoration is the most important potential river restoration measure for the study area. The water managers are still in the phase of fine tuning their plans. Hence, the design of the floodplain restoration measure is not yet finalized. However, experiences from previous projects (e.g. [8]) made clear that without a detailed design, effects of the planned measure on ecosystem services can hardly be estimated due to vagueness and uncertainty. Therefore, a draft detailed hypothetical design for the measure has been used for this assessment (see Fig. 2).

Fig. 2. The draft design of the floodplain restoration measure involves dyke realignment, land use change (agriculture to nature) in the German part of the study area and increased meandering in the Dutch part of the study are. The indicated realignment – from red (current) to yellow (future situation) – is hypothetical.

The draft design involves dyke realignment, thus creating more 'space for the river', land use change (agriculture to nature) in the German part of the study area and increased meandering in the Dutch part of the study area. During the project, the design has been adjusted and the changes have been taken into account in the estimation of the costs and benefits.

Step 2 First qualitative participative assessment of costs and benefits

Five Dutch and five German local stakeholders were interviewed (in their own language) about their estimations of the effects of floodplain restoration on

their own stakes and on those of others. Interviewees were: representatives of local water management authorities, residents, and of different sectors, such as nature conservation, agriculture and tourism.
The interviewees were also asked for suggestions for proper indicators for quantification of the effects. The results were discussed in a workshop. The outcome was a list of the – according to the stakeholders – most significant (potential) costs and benefits resulting from the measure.

Step 3 Availability of required in depth information about costs and benefits

After the first workshop there was uncertainty for some identified positive and negative effects of the measure on different stakeholders; e.g. uncertainty if they will really occur and to what extend. In some cases the discussion was about the fear that costs will arise or the hope for positive effects. Table 1 provides examples of the anticipated effects and which additional information was regarded helpful for better estimating the consequences of these effects, i.e. to better estimate the costs and benefits.

Step 4: Identification of imbalances in costs and benefits

In the second workshop participants discussed which imbalances are most important to further address jointly. Related to these imbalances the following issues were raised:

Possible effects [costs/benefits]	Information needed	Availability of information
Effects of changes in habitats for mosquitos/ other parasites on disturbance and diseases [potential cost for agriculture and recreation]	Will new (wet) nature in the floodplains lead to an increase in mosquitos or other parasites, that may reduce recreational value or put human and livestock at risk?	Expert judgement from University of Oldenburg, the Veterinärgesundheitsamt and NLGA*: The likelihood of invasive insects with non-appeared diseases so far in this region increases with climate warming and the occurrence of standing waters to get enough food. Changes in occurrence and abundance of mosquitos as a result of the measure are uncertain and bear probably not too much risk. Because of the uncertainty and especially the fear for negative effects on livestock, stakeholders agreed to monitor the occurrence of parasites.
Effects of changes in birds habitats on crop production [potential cost for agriculture, related to benefit for nature]	Will the creation of new habitats for birds increase damage to crops by specific birds?	Expert judgement from nature protection organisation and monitoring of other nature development projects in the wider region: it is expected that in the Vecht region this will be not a problem since the goose that occurs here (bean goose) does not eat from the farmland.
Effects on navigability [potential cost for recreation, related to benefit for nature and water management]	Will the more dynamic river system and semi-natural maintenance policy of the water managers lead to problems for navigability as a result of erosion and sedimentation in river bed?	Water managers' information about minimum required depth for water discharge, policy for dredging (only if necessary for discharge; no dredging to enable boating; expectation that there will be no problem for the planned 'zompen' boats), experiences from previous projects in other parts of the Vecht (see sedimentation at Junne); feasibility study boating with specific type of boats (results not available yet).
Effects on tourism economy [potential benefit for tourism sector, including agro-tourism, potential cost for tourism due to restrictions for recreational use of the Vecht basin]	How realistic are the potential positive and negative effects on tourism? Which farmers could possibly profit from agro-tourism?	Feasibility study boating with specific type of boats (results not available yet), expert judgement from entrepreneurs and municipality (difficult to quantify expected effect; proposal to do benchmark study to learn from another region).

Table 1: Possible effects resulting from floodplain restoration and information needs for better estimation of the likeliness and magnitude of these effects.

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- Since nature seems to profit a lot, or maybe even the most from the dyke realignment measure, it was discussed if parties responsible for nature protection should maybe also co-fund the measure. However, as sharing the costs in general also leads to sharing control, water managers were reluctant to this solution- given that in the real planning process, the the costs of the measure were already covered.

- As a means to deal with conflicting recreation and nature protection desires, the implementation of temporal and spatial zoning of the landscape (quiet and busy zones) gained most support.

- Tourism can benefit from the increased attractiveness after implementation of the measure. Realisation of this potential benefit depends on several conditions beyond the measure, such as investments into infrastructure (i.e. ability of tourists to enter into the area via bicycle trails).

- While some entrepreneurs in the region may benefit from increased income from tourism, local residents with no direct revenues may fear increase in noise or litter. On the other hand, increase in tourism may help to sustain local facilities like shops and recreation facilities from which also the residents benefit.

- Regarding the mosquito issue it was concluded that the effects of the measure on the occurrence and abundance of mosquitos are uncertain and bear probably not too much risk. However, it was agreed upon that monitoring is needed, because of the uncertainty and especially the fear for negative effects on livestock.

- Depending on the planned land use change, farmers are likely to face costs due to the loss of land (and thus production capacity) or loss of income e.g. due to damage by increased trespassing. From a farmers' perspective, this needs to be compensated, e.g. by enabling extensive agriculture, land swop or financial compensation.

- Looking at the differences between Germany and the Netherlands no significant imbalances in costs and benefits between the countries but between stakeholder groups are revealed. Differences between the countries were considered more as learning opportunities instead of imbalances.

Preliminary discussion and conclusions

Although the design of the floodplain restoration measure was not definitive during the stakeholder participation process, it proved very helpful to use a detailed draft design. Without that it would not have been possible to estimate costs and benefits due to uncertainty about the changes in the landscape resulting from the measure. This draft detailed design supported the assessment, although it is a challenge to adapt to the new versions of the draft design.
Estimating the effects of a measure on the provision of ecosystem services used by different stakeholders might seem difficult as the assessment has to cover the full array of all possible ecosystem services and their beneficiaries. However, the stepwise approach we used – that starts qualitative and moves towards prioritized issues for which more detailed information is needed – helped to deal with this complexity.
The workshop participants indicated that the joint assessment provided them more insight in, and understanding of the (potential) effects of the proposed measure on the stakes of different stakeholders. It revealed to them that the imbalances in costs and benefits are mainly related to their different uses – and hence appreciation – of the Vecht river basin.
When it comes to balancing costs and benefits of the floodplain restoration measure between stakeholders, the mechanisms proposed by stakeholders are mainly focused on cooperation and adaptation measures. Mainly for farmers who loose land or face limitation in agricultural management, there is need for compensation mechanisms to balance their costs with benefits for other stakeholders.
Whether the stepwise assessment of the effects of floodplain restoration and costs and benefits associated is supportive to a real negotiation process for balancing costs and benefits has still to be demonstrated. It seems to be difficult to find opportunities for co-investments in future river restoration measures in a pilot study in which funding sources for the proposed measure are already fixed. Concerns were also expressed that the contribution of different stakeholders to one measure might confuse competences and lead roles in the planning process.
If a real negotiation process will be started, it is important to consider conditions in which potential costs and benefits really occur. For example, to be able to exploit the increased attractiveness of the Vecht landscape for tourism it is needed to also invest in the touristic infrastructure. Moreover, potential costs and benefits for stakeholders depend on the specific context and preferences of the stakeholders. Because of this a negotiation process is meaningful; the co-investors know their preferences best. Examples from the Netherlands show that part of the farmers' community is able to profit from tourism and investing in tourism infrastructure but this is not applicable to all farmers, depending on their location and personal preferences.
Currently, the project team works on a PES proposal that addresses the imbalances and is exploring opportunities to organize a final workshop with the stakeholders in which this proposal is discussed and – as far as feasible – agreed upon.

LITERATURE

1 Van der Meulen, S, Neubauer, L., Brils, B., Borowski-Maaser, I., 2012. Towards practical implementation of the ecosystem services (ES) concept in transboundary water management. Deltares report 1204644-000-BGS-0004.
2 UNECE, 2007. Recommendations on Payments for Ecosystem Services in Integrated Water Resources Management. United Nations Economic Commission for Europe (UNECE), Convention on the Protection and Use of Transboundary Watercourses and International Lakes, United Nations, New York and Geneva, 2007.
3 Wunder, S., 2005. Payments for environmental services: some nuts and bolts. Occasional Paper No. 42. Bogor, CIFOR.
4 Greiber, Th. (Ed), 2009. Payments for Ecosystem Services. Legal and Institutional Frameworks. IUCN, Gland, Switzerland. xvi + 296 pp.
5 Engel, S., Pagiola, S., Wunder, S., 2008. Designing payments for environmental services in theory and practice: An overview of the issues. Ecological Economics 65, 663 – 674.
6 www.catalogusgroenblauwediensten.nl
7 DHV, 2009. Die Vechte; ein grenzenloser, lebendiger Fluss. Grenzüberschreitende Vechtetal-Strategie (in German). DHV, 2009. De Vecht; een grenzeloze, halfnatuurlijke rivier. Grensoverschrijdende Vechtvisie 9in Dutch).
8 Suzanne van der Meulen, Jos Brils, Jacco de Hoog, 2011. Ecosysteemdiensten als verbindende taal in gebiedsontwikkeling, Case peilbeheer en beekherstel. Deltares-rapport 1202272-003.

BETALING VOOR ECOSYSTEEMDIENSTEN TER ONDERSTEUNING VAN RIVIERHERSTEL

Waterbeheerders zien potentiele meerwaarde in een ecosysteemdienstenbenadering in het waterbeheer. Dit bleek onder andere uit ons pilotproject in 2011, waarin met name interesse naar voren kwam voor betaling voor ecosysteemdiensten. Er is echter een gebrek aan praktische ervaringen die aantonen hoe deze aanpak het waterbeheer kan ondersteunen. Daarom is in een grensoverschrijdend deel van de Vecht een opvolgend pilotproject uitgevoerd om de praktische toepasbaarheid van het ecosysteemdiensten concept, en in het bijzonder betaling voor ecosysteemdiensten te onderzoeken ter ondersteuning van rivierherstel.
Dit artikel geeft de voorlopige inzichten van het project, dat eind 2013 wordt afgerond. De deelnemers aan het onderzoek (betrokkenen vanuit landbouw, waterbeheer, toerisme, gemeente, natuurbescherming) geven aan dat zij inzicht hebben gekregen in kosten en baten van de specifieke maatregel uiterwaardeherstel voor verschillende partijen en op welke wijze zij om willen gaan met ongelijkheid hierin. Ook wordt beschreven hoe de analyse, op basis van veranderingen in de levering van ecosysteemdiensten, is uitgevoerd en dat op praktische wijze kan worden omgegaan met complexiteit. Ten slotte worden aanbevelingen gedaan voor een onderhandelingsproces met betrokken partijen over gezamenlijke investeringen in maatregelen in het projectgebied.

PAYMENT FOR ECOSYSTEM SERVICES (PES) IN SUPPORT OF RIVER RESTORATION.

Water managers expect that the concept of ecosystem services might have added value for water management. There is special interest in the potential of Payment for Ecosystem Services (PES). This was the conclusion from our pilot study in 2011. However, there is lack of practical experience to demonstrate how the ecosystem services approach can support water management. For this reason, a follow-up pilot study was started in the transboundary part of the Vecht river basin. The aim of the project is to assess the practical applicability of the ecosystem services approach, with special focus on payment for ecosystem services in support of river restoration.
The present paper provides preliminary results from the project that will be finished by the end of 2013.
The workshop participants (stakeholders from agriculture, water management, tourism, municipality, nature protection) indicated that the assessment provided them more insight in, and understanding of the (potential) effects of the specific measure wetland restoration on the stakes of different stakeholders and how they want to deal with unbalances in costs and benefits.
This paper also describes how the assessment of costs and benefits, based on changes in the provision of ecosystem services, is performed and that it is possible to deal with complexity in a practical manner. Finally, recommendations are given for the negotiation process about co-investments related to the planned measure in the study area.