

Paying for Green?



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Payments for Ecosystem Services in Practice

Successful examples of PES from
Germany, the United Kingdom and the United States

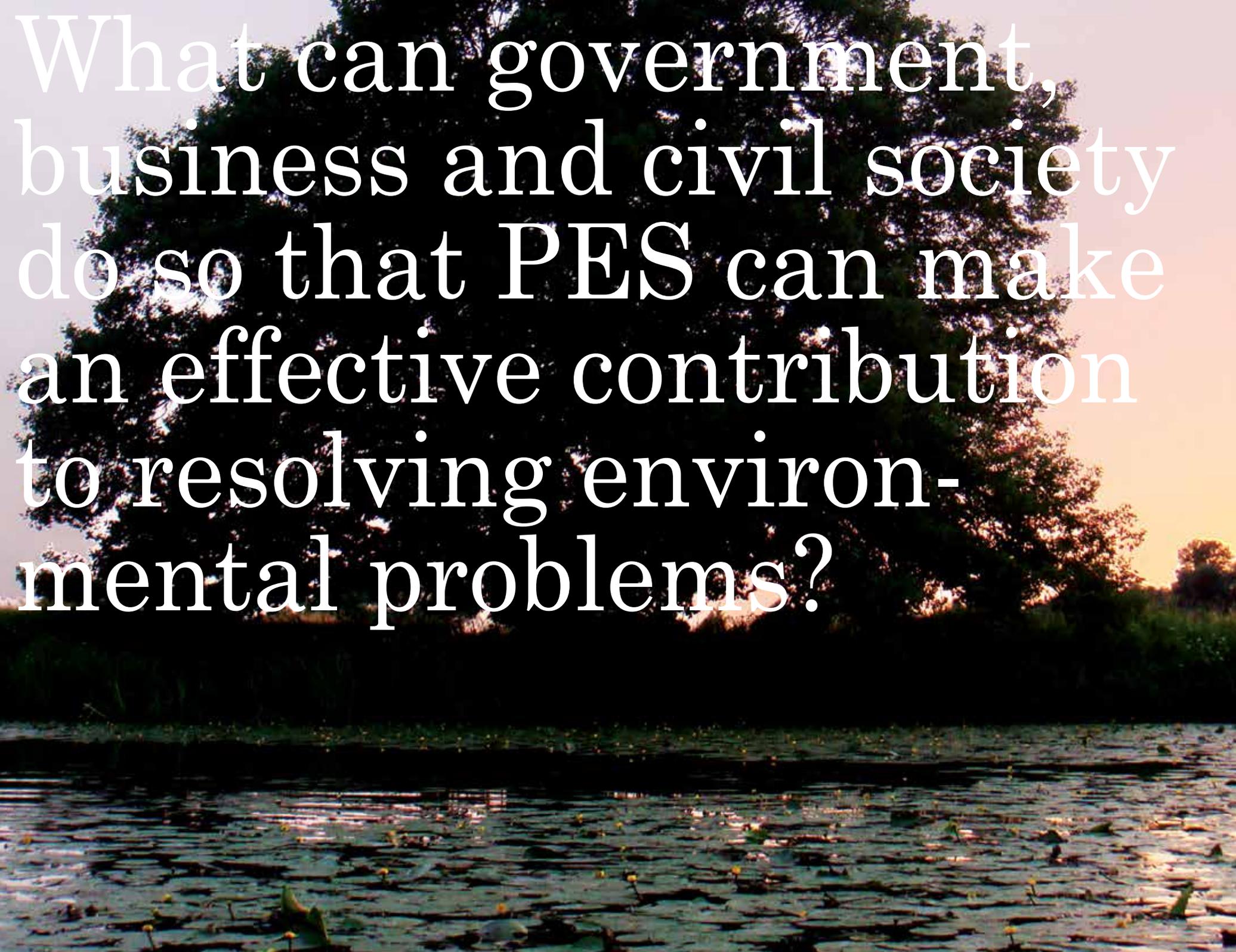
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Payments for Ecosystem Services in Practice.
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The background of the slide is a photograph of a pond. The foreground is filled with numerous lily pads floating on the water. In the middle ground, there is a dense line of green trees and bushes. The sky is a mix of orange and yellow, suggesting a sunset or sunrise. The overall lighting is soft and warm.

What can government,
business and civil society
do so that PES can make
an effective contribution
to resolving environ-
mental problems?

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Preface

Our purpose in writing this book is to enrich the PES discussion with examples of successful practice. The book is addressed in particular to nature conservation practitioners; we want to encourage them to get involved proactively with PES and, in the best case, inspire them to put forward their own ideas.

Positive incentives in terms of Payments for Ecosystem Services or PES for short, are an approach to addressing environmental problems that is currently very much in the focus of discussion in research and practice. The initial euphoria is now being

followed by a period of more sober assessment of the potential and of vocal criticism. Our purpose in writing this book is to enrich the PES discussion with examples of successful practice. We are particularly concerned with the potential of the approach and the necessary conditions for the development and application of PES.

That is why we are particularly addressing nature conservation practitioners, i.e. people in environmental groups or nature conservation and agriculture agencies who are seeking solutions to environmental problems on the ground. It is these whom we want to encourage to deal intensively with the PES instrument and at best to inspire them to contribute ideas of their own. For that reason the focus of this book is on practical examples of implementation and less on the academic discussion of PES.

CIVILand, our interdisciplinary research group, has devoted itself to research on PES for over five years. Our focus has been on getting a picture of the institutional diversity of the PES approaches as well as getting to understand the role, the strengths and the motives of the actors involved, and in particular the civil society stakeholders. Some of our main questions were: What kind of environmental problems are PES used for?

How does the payment work and how is the amount set? Which stakeholders are involved, what interest do they have in it and what are their motives? What is their role? How does the interaction between regulatory requirements and voluntary payments work? We conducted our concrete analyses to find answers to these questions in three industrialized countries: Germany, the UK and the United States, while realizing that PES are a meaningful approach in developing countries as well. We selected these three countries because there the PES approach has had to be integrated into an environmental policy that has already existed for many decades. The different interpretations of the role of government and civil society and of property rights, as well as the various socio-cultural differences, have been especially fascinating for the comparison between those countries.

An in-depth look at specific PES projects and programs was fundamental to getting answers to our research questions. In diverse interviews, workshops, meetings and round table discussions, we noted a strong interest in a mutual exchange of information on existing PES. Above all the practitioners were curious about how PES are generated elsewhere and whether there were any new and innovative concepts. We should bear in mind, however, that in the context of the development of PES, 'practitioners' are not always easy to differentiate from 'researchers' and there are close ties between research and practice. In particular, the interest in an interchange between the different countries and the question of what makes projects successful under various conditions was clearly noticeable.

This great interest in a national and international interchange motivated us to write this book, as well as some typical scientific publications, on the subject of PES. Its core is a selection of successful examples of PES from the three countries under study. The



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selection of successful PES was guided by the assessment of users, those that devise such approaches themselves or actively promote their implementation and further development.

It is those committed people that we would like to thank at this point: Above all we thank the experts in two workshops, one in Germany and one in the United States, who laid the foundation for this book. During those workshops, examples of success were identified and there was intensive discussion about what makes PES a success. We are likewise indebted to the managers of the selected examples, who took the time to prepare compact descriptions of their PES with us. In in-depth interviews, they not only gave us a detailed picture of the mechanisms of the programs and projects but also shared with us their personal motives and visions. These interviews showed us clearly what the key to the success of PES is: Highly motivated, dedicated people who have the ability to bring the various stakeholders together and to create long-term networks. Last but not least, our thanks go at this point to the many interested colleagues and experts we encountered in the course of interviews, surveys and conferences in the context of the CIVILand project. These include in particular the many CIVILand partners from the realms of research and practice who supported us within the framework of the Project Advisory Committee. Without the experience and expertise of all those mentioned, this book would not have arisen.

It is only natural in a ‘book of good examples’ that we have the potential of the approaches in focus. You hold a book in your hands, then, that emphasizes the strengths of PES. However, the book is anything but a plea for their indiscriminate use. Whether PES can be successfully developed and deployed depends basically on the concrete environmental problems, the

existing regulations and the stakeholders with their different interests and motives. As our examples also show, regulatory legislation is in many cases not just the general framework but is an essential component of PES.

To make this specific aspect clear, we begin our book with a characterization of PES. There are differing ideas on this matter, both among researchers and among practitioners. Following the theoretical introduction to the topic, our 19 examples show how the PES concept can be implemented in practice. The descriptions provide information about the backgrounds and objectives, payment mechanisms, funding concepts and stakeholders as well as about existing problems and future prospects. In summing up the main characteristics of these examples, we try to identify criteria and conditions that seem to be important for the success of a PES. And in the final chapter we discuss in detail the possibilities and limitations of PES. Here again, the focus is on the stakeholders and hence on this question:

What can government, business and civil society do so that PES can make an effective contribution to resolving environmental problems?

Concept. Who pays for what and why?

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Ideal and reality

Economic instruments as a solution

Diverse studies have shown that despite various efforts the state of our natural resources as well as the development of biodiversity and climate change are still a cause for concern. This is the case at the global level as well as at the level of individual countries and regions. In the industrialized countries in particular, they have been trying to solve environmental problems by regulatory means for many decades. And still the problems are increasing. It is not surprising, therefore, that different and complementary means of exerting influence have repeatedly been sought. Against this background, the attention given to economic instruments to resolve environmental problems has increased worldwide in recent years. In the wake of large international studies such as the “Millennium Ecosystem Assessment” of the UN and the international as well as national TEEB studies on the economic value of ecosystem services and biodiversity, there is growing interest in particular in Payments for Ecosystem Services, PES for short. How can this interest be explained, and what is the distinguishing feature of PES?

The increased attention given to PES is closely related to the establishment of the ecosystem services approach, whereby a social and economic value is attached to nature. This is the basis of PES reasoning: When such a value is ascribed to an ecosystem service, then this value can be realized specifically at the moment when that service is scarce. Someone should be ready to pay money for a scarce ecosystem service. Hence the users of ecosystem services are the starting point of the discourse: Who uses clean drinking water? Who enjoys a scenic landscape? Who benefits when our rivers and lakes are less nutrient-rich? If we carry this further we can conclude that when

Ecosystem services and biodiversity

The abiotic and biotic elements, structures and processes of an ecosystem that contribute directly or indirectly to human well-being are referred to as **ecosystem services**. A distinction is currently made between e.g. (i) provisioning (as a basis for food, raw materials and energy), (ii) regulating (among other things, regulation of the climate, the water balance and soil formation) and (iii) cultural (including outdoor recreation, leisure activities, education, spirituality) goods and services. Human input is necessary as well for some final ‘ecosystem’ structures, such as species-rich grasslands. **Biodiversity** is the basis for the diverse services of ecosystems and has value for many people independent of its use. The term covers not only the diversity of animal and plant species but also genetic diversity within individual species and the diversity of ecosystems and their functions.

the benefits decline (“we have an environmental problem!”) those users would in their own self-interest pay to have the benefits restored or continued.

Private negotiated solutions

This would be the ideal case, and was described in economic textbooks long ago as a theoretical construct: In addition to influence exerted by government through regulatory legislation or taxation of misconduct, that is through disincentives, private negotiations are also an available solution option. In such negotiations the provision of an ecosystem service is agreed upon.

Let’s take an example: A water company uses a natural source of drinking water and would like to extract clean drinking water. The company contacts the farmers in the catchment area of that source and gets them to agree voluntarily to use less fertilizer so as to reduce the amount of nitrates in the drinking water. The company pays the farmers for cutting back on fertilization.

Property rights and

The subtle difference between valuable and scarce

There are many ecosystem services that are essential to us humans. We can't live without water, so water is very **valuable**. If someone is willing to pay for a service or good, his willingness to pay shows that he is prepared to do without something else that he could otherwise have bought for the money. And it is when the valuable service or good is **scarce** in the economic sense that he does that. The distinction between valuable and scarce is important, because there are ecosystem services that are very valuable but for which there is (currently) little willingness to pay. Hence they are not, economically speaking, scarce. A distinction has to be drawn as well between what one is willing to pay and the price paid: The price is set on the basis of negotiations between buyers and suppliers and may be significantly lower than what one is willing to pay.

Such decentralized solutions, without governmental intervention, are supported mainly by adherents of a liberal economic system and are called "Coase solutions" after Ronald Coase, who was the first to describe them. Of course this solution only qualifies for our example if the farmers have the fundamental right to pollute, that is, if they are entitled to cause pollution of the drinking water. If that is not the case, the government must ensure that the beneficiary of the source of drinking water can enforce his right to clean water without payment. Whoever considers the establishment of PES must therefore address the conditions of property rights.

It is in the nature of things in the truest sense of the word that privately negotiated, purely user-financed, payments for ecosystem services and biodiversity rarely occur in practice. For what sounds promising in theory often fails due to the complexity of social ecological systems. Let us take a closer look at the reasons for this.

Alternatives to technological solutions

The private, beneficiary-initiated negotiated solutions described in the above example are always an option whenever someone benefits from an ecosystem service privately or commercially and is willing to pay for that benefit. So there must be a marketable commodity. With reference to our example, that means that the water company wants to sell low-nitrate drinking water and therefore has an economic interest in clean drinking water.

If the nitrate concentrations are high, the water company has two options: Either reduce the nitrate content of the drinking water after extraction by means of filters or take action to identify the source of the nitrates and reduce the inputs. The water company will choose the latter option for the most part if it is more cost-effective and the reduction of inputs is relatively sure to have the desired results in the near future.

The choice the water company makes will depend largely on the information it possesses, the risk it is ready to take and its environmental awareness. Risk-taking is relevant in this respect because the second option, minimizing the nitrate content of drinking water by reducing input, is less sure in terms of results than engineering solutions. Environmental awareness is crucial because every environmentally-interested water entrepreneur knows that reducing input is not just good for the quality of their own drinking water but has a beneficial effect on various other ecosystem services and biodiversity as well. Ideally, the company could market these other ecosystem services at the same time and improve its market position through its environmental commitment as well. The environmental awareness of the company is also important, because technological solutions are not only more controllable but also more predictable

distribution

and there are economic stakeholders – the filter plant suppliers – who can in their own interest inform the water company just what the cost and effects of these technological solutions will be.

But who will have an interest in providing detailed information on nitrate reduction through the reduction of agricultural runoffs? It is at this point that we have to speak of what are known as intermediaries. We count among these all the stakeholders who have the ecological expertise and necessary environmental data, information and contacts with potential providers of ecosystem services and who are trusted by the future contracting parties. We shall encounter intermediaries in many places in this book.

Importance of property rights

As mentioned above, who gets paid by whom in the context of private negotiated solutions depends on property rights. In our example, payment is made for reducing any negative impact on drinking water; for the reduction, economically speaking, of negative externalities. Payment is made to whoever provides the service, in our example the farmers. This is in line with the so-called provider-gets-principle. If, however, the property rights

Externalities

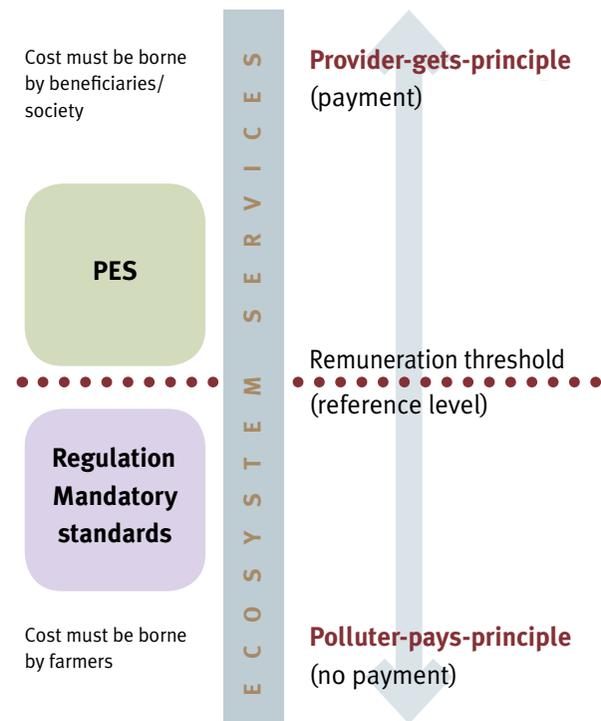
The actions of a company or a private person not infrequently have positive or negative impacts on other market players who are not rewarded (in the case of positive effects) or for which the perpetrators are not made accountable (in the case of negative effects). These impacts are therefore usually not taken into account when the company or the individual makes economic decisions.

Intermediaries

We use the term intermediaries for those players who support the emergence of PES and who therefore mediate between service providers and beneficiaries in one way or another and ensure that the exchange of payments in the context of implementation works well. They play widely differing roles: Some are the actual initiators of the PES and develop and implement them. Some identify the service providers and beneficiaries, bring them together and devise solutions pertaining to the actual transfer or the design of the PES.

to the drinking water are clearly defined in the sense that it may not be adversely affected by anyone, the water company could claim compensation for the filtering cost from the farmers under private law. In such a case, the polluter is called to account and the polluter-pays-principle applies. Now the farmers have two options: either they pay up or they make suggestions as to how the runoffs can be reduced. In this legal situation, the government could, alternatively, impose the regulatory requirement on the farmers to take appropriate action. Either way, the farmers shoulder the cost.

Whether this assumption of accountability has to be sued for under private law or the government has to intervene depends on the details of the legal framework or the applicable legal system. While in Germany, for example, in such a distribution of property rights the government is more likely to impose conditions on land users through regulatory measures, private suits for damages are quite common in the United States. In both cases, PES are irrelevant. So whether PES are an option depends on the distribution of property rights, making it a societal decision.



Service and payme

The discussion shows that PES are not an alternative to regulatory legislation. They can supplement it. The imposition of disincentives such as environmental taxes would be the economic alternative to regulatory legislation. So it is not possible to simply call for PES to replace regulatory legislation; that would amount to a change in property rights and would require a societal decision against the background of the distributive justice issue. In Germany, owners and farmers are expected to have a relatively high degree of social responsibility. Because of that it is quite common here to restrict agricultural use in protected areas, without any need for compensation.

PES offer the option to pay for the provision of ecosystem services and biodiversity within the framework of the existing system of law described above, and hence they open up a number of new approaches to resolving our urgent environmental problems. However, the existing sensitive structure of rights, obligations and social norms must be taken into account when PES are introduced.

PES as we understand them

Let us delve more deeply into the question of what specifically is being paid for: In our drinking water example, the money is not for the actual ecosystem service. That, strictly speaking, is paid for by the drinking water users when they pay their water bills. What is being paid for is rather the reduction of negative impacts on the drinking water. The negative impact does not occur because the farmers benefit from the water themselves, but because their activity adversely affects the ecosystem services of the water. In other words: The right of contamination is bought from the farmers. The farmers for their part have several options. They could fertilize less, or

use a different kind of fertilizer. They could also use ecological processes to minimize the total runoff. In many cases, when we speak of PES, we mean just such constellations: Payment is made for reducing allowable negative externalities. But payment can also be made in the framework of PES for the actual provision of ecosystem services and biodiversity. For example, the owners of land in the area of a river floodplain can be paid for maintaining the floodplain and thus preserving a natural nutrient filter and nutrient holder and ensuring that the floodplain serves its purpose in terms of flood control. Measures aimed at re-naturalizing specific parts of a landscape and thus restoring desired ecosystem services are also a form of PES. And finally, in the cultivated landscape of Europe in particular, it is necessary to cultivate parts of the landscape extensively in order to maintain or to increase biodiversity and the recreational value of the land.

Thus land users are paid in the context of PES for reducing allowable negative external effects on ecosystem services or for taking action to preserve or restore ecosystem services and biodiversity. So we take quite a broad view of PES, taking into account the targeted provision of ecosystem services and biodiversity through various measures.

Determining the amount of payment

If we define PES in this way, centered on the human performance that is needed to provide ecosystem services, it is clear that the price for the service in a PES can hardly be regarded as equivalent to what people would be willing to pay for the ecosystem services and biodiversity or to the value of the benefits from ecosystem services. Indeed, given the sensitive property rights structure we have described, high prices and/or profits for service providers would be highly questionable: Why should the farmers



in our example be rewarded for reducing the pollution of the water to be fed into the drinking water system by being paid the full value of that service? In cases, on the other hand, when ecosystem services and biodiversity can only be made available (again) and secured through human action, it should be possible for the ‘producers’ to attain a business profit. This is particularly true if a sort of social entrepreneurship is to develop in this area.

The amount of the prices or payments in the PES framework depends predominantly on the opportunity cost or the cost of production. For that reason an economic assessment of the ecosystem services concerned is not necessarily needed, especially since such monetization is often very difficult and repugnant to many people. However, the cost of paying service providers as well as the time and money spent to establish and implement the PES, that is, the transaction costs, taken together must be lower than the economic and/or social value of the ecosystem services. The rough estimate of this value might therefore be an important factor in deciding whether or not a PES is economically worthwhile. On top of this, it is hoped that the clarification of the monetary value of an ecosystem service, reduced, as in our example, by negative externalities, will contribute to people being willing to pay for the preservation of that service.

Transaction cost

A PES must be developed, the ecosystem services must be defined and quantified where possible, the buyers and suppliers must get together, information must be exchanged, a common basis of understanding created, contracts drafted, compliance with contracts verified and the results of payment monitored. This is only a selection of the steps that are necessary, some of them very burdensome, in the context of a PES. This burden induces costs which in economics are included under the heading “transaction costs”.

Outputs and inputs

Effectiveness and efficiency

By **effectiveness** we mean the extent to which the instrument fully and precisely achieves the objectives, regardless of the effort expended. **Efficiency**, however, has to do with the means used to achieve a target. What counts here is the cost-benefit ratio. Efficiency means that either a given goal was achieved with a minimum of cost or a specific budget was used for maximum benefit. So a PES is called effective if and when the objective, that is, the preservation or provision of the ecosystem service, has been achieved. It is considered efficient if this has been achieved at minimum cost.

PES and regulatory legislation

We now want to take a closer look at what the advantages of PES are from the economic perspective: First, they allow us to influence land use in a targeted way without resort to regulatory legislation. Allowable negative impacts on ecosystem services and biodiversity can be reduced, and voluntary preservation or recovery of specific ecosystem services can be promoted. Second, PES are theoretically assumed to have notable advantages over regulatory requirements in terms of effectiveness and efficiency: Instead of calling directly for a certain kind of behavior, PES ideally allow players to choose between various lines of action and opt for the one they consider to be most efficient in the given situation.

This can be accompanied by mobilization of the (economic) self-interest of the stakeholders to resolve the problems. So at best, those who are paid have a vested interest in the provision of ecosystem services and biodiversity and use their knowledge to make such provision effective and cost-efficient. So they are motivated by PES to look for appropriate inputs themselves, individually, in their own best interests.

Form of payment

However, this presupposes that the payment can be linked directly to the provision of the service. In our example of the drinking water problem, the payment to the farmers would have to be directly related to the reduced nitrate content of the water. Let us take the example of building a house to illustrate this: The client describes as accurately as possible what the house should look like, but he does not dictate to the contractor the steps to be followed to build the house he wants. Payment is made when the house is built the way the client wants it. In the case of PES, that means that the ecosystem services provided must be clearly defined, but at the same time there has to be a great deal of flexibility at the action level so that the economic advantages of PES can take effect.

In our example the farmers are ideally rewarded when the drinking water has low levels of nitrate. In such a case we would speak of an output-based payment. Unfortunately, however, in our example we have a situation that is typical of many cases: The relationship between the action of the individual farmer and the water quality cannot be established directly, because the water quality depends not only on his actions but on various other factors that the individual farmer cannot control. The drinking water quality is affected by many different input sources that cannot be unequivocally identified, and hence by diffuse nutrient inputs. Also, reduced fertilization or other measures to reduce nutrient inputs into the waters do not take effect immediately. Instead there is a time difference between the actions of the farmer and the measurable impact on the water quality. In this case, it will not be possible to link the payment of a farmer directly to measurable water quality.

Nor should it be forgotten that the farmers in our example

have to know a great deal about the connection between their farm management and the related runoffs into the groundwater and surface waters. Such information must be available before the relevant decisions can be made. This is where the intermediaries enter the picture again, because they often assume the role of information brokers and advisors.

The development and implementation of output-based payments is a major challenge. Ecological systems are complex, and the so simple-sounding demand for a clearly defined and measurable target cannot always be met in the context of ecosystem services and biodiversity.

But this is a demand raised not only by the service providers but also by the buyers and/or financiers. The latter want to be sure on the one hand that the agreed service will actually be provided (conditionality) and on the other hand that this performance would not be provided without the payment (additionality); otherwise they could have saved their money. So the definition and measurability of the service being traded plays a decisive role for the buyers as well.

This makes all the more sense if we remember that in the discussion on economic instruments stress is placed as a matter of principle on the potential of markets for those looking for efficient solutions. Sometimes the concept of “market-based instruments” is even used interchangeably for economic instruments. In actual fact, however, real markets, where supply and demand as well as prices develop freely without governmental intervention, have in practice played a subordinate role so far. However, there are interesting approaches to establishing such market mechanisms in the field of PES, as the following comments show.

Output-based versus input-based payment

In the case of **output-based** remuneration the payment is linked directly with the desired state of the ecosystem service, for example to the nutrient levels in the ground water. In the case of **input-based** payment, in contrast, payment is made for a specific action that is assumed to lead to the provision of an ecosystem service. What we find mostly in practice are hybrids between output-based and input-based approaches, especially since the environmental phenomena are often very complex. It is therefore helpful in assessing whether a payment is more input-oriented or more output-oriented in its design to consider whether the service providers have alternative courses of action to choose between at the local level. If that is the case one can speak of a more output-based focus.

Conditionality and additionality

In the context of PES, **conditionality** requires that an ecosystem service be actually provided or the required inputs leading to the provision of ecosystem services be implemented. **Additionality**, however, pertains to the fact that an ecosystem service would not have been provided without the payment and hence is provided only because of the payment.

Negotiation and ac

Use of market mechanisms

Let's take another look at our drinking water example: In order to make cost-effective use of the available budget, the drinking water company might set as a target the amount by which the nitrates in the watershed should be reduced. Then, in a competitive procedure, it would call on the farmers to submit tenders for steps to prevent nitrate runoffs at a specific price. On the basis of the tenders the drinking water companies could then select the service providers with the best price/performance ratio. The challenge in this tender procedure, just as in the development of output-based payment, is that the target has to be specifically defined, appropriate inputs identified and the associated nitrates quantified. Some examples have been found in practice where this procedure is applied.

As a kind of second-best solution, the drinking water company could obtain tenders from farmers for concrete steps, but would have to specify what these steps would be without knowing whether other steps might not be more suitable for the farmers.

erty rights are distributed in such a way that runoffs into the drinking water are completely prohibited or may not exceed a certain limit. If that is the case, government can set certain farming restrictions. But it can also establish a so-called cap and trade system and thus define the maximum volume of pollutants that can be discharged into a watershed. This approach is relatively well known in the field of carbon trading.

In our example, the implementation might look like this: The emissions permits determined on the basis of the maximum allowable volume are distributed according to specific criteria among all the farmers in the water catchment area and can be traded by the beneficiaries among themselves. The theory is that the farmers who reduce their nitrate loads are those that can do so at the least cost.

If the pollution caused by farmers through their current management exceeds their emissions allowance, they have to either buy additional emissions permits or reduce their emissions, their fertilizing. But they can also use ecological processes such as the filtering effect of some vegetation to reduce the contamination of the drinking water. This could result in a PES. Because in that case, farmers whose pollution allowance is not sufficient could, for example, pay other stakeholders for establishing riparian strips, as long as this can generate officially approved certificates of minimization of contamination. It is important to emphasize once again that the CAP system is a tool for improving cost efficiency. The actual environmental impacts result from the setting of threshold values.

A PES can also come about when only the environmental standard is set, without emission permits being distributed and a trade being planned. The Clean Water Act in the United States is a good example: Based on it, limits are set for individual companies relating to the discharge of pollutants into waters. How companies comply with these requirements is left to their economic skill. They can use

However, the use of market mechanisms can also be linked to regulatory legislation or set in motion by regulatory measures. Let us assume, in our drinking water example, that prop-

Cap and Trade

A limit to the use or pollution of a resource is set for a defined region (cap). On the basis of that limit, restricted emissions permits are assigned that can then be freely traded (trade). If the use of the resource exceeds the number of emissions permits one has, either additional permits must be acquired or investments must be made in measures to reduce resource use. How much the total environmental pollution is reduced depends on the number of certificates or credits awarded. The main objective of a cap and trade system is cost efficiency.

tion

either technical solutions or ecosystem services, such as the filter function of certain vegetation.

Importance of intermediaries

A cap mechanism can also be established on a voluntary basis. If the water company in our initial example prefers not to sign a contract on payments for reducing nitrates with each individual farmer in the catchment area, it could, for example, contact an association that defends the interests of farmers in the catchment area. The company could come to an agreement with the association on a limit for the entire area and hence for all farmers. The association would then have to find ways to achieve this avoidance of nitrate runoffs. It could use the market mechanisms described earlier. Such approaches are especially important where a certain number of participants is essential for the provision of the ecosystem service. In our example: If in the end the water company can conclude contracts on decreasing nitrate discharges only with three out of twenty relevant farmers, the money for those three farmers would most likely be wasted, since despite the payments the drinking water would not have the necessary quality. If the water company signs a contract with the association, it is the association that has to organize the rest of the process.

It is clear from all these different design options that there is a need for intermediaries who operate at the interface between service providers (in our case farmers) and beneficiaries (in our case the water company). And it is clear from this reasoning how elaborate and therefore how transaction cost intensive the PES venture can be. Precisely because very high transaction costs are often incurred in the development and application of PES, regulatory legislation can in the end be a better solution eco-

nomically and also a safe long-term option. So, in these cases, the application of regulatory legislation is justified for reasons of effectiveness and efficiency. In our example the reduction of nitrates to obtain clean drinking water would be enforced by law, for example through specific management requirements for farmers. Farmers could then be compensated for the resulting extra costs or loss of income, for social reasons or for property rights-related reasons. Such a procedure is well known, for example, in the area of the gray infrastructure, i.e. road construction, the expansion of the electricity grid and the like.

These observations show that, depending on the situation, regulatory legislation and governmental action can be an essential prerequisite for the development and implementation of effective and efficient PES. So in the next section let us take a closer look at the importance of the interaction between market and government for PES, and while we are at it take a closer look at the role of the intermediaries as well.



Buyers and suppliers

Importance of government

The discussion of our drinking water example so far has shown that even when the initial situation is simple there are a variety of options for solving an environmental problem and that PES can play a crucial role in this. Why do we speak of a 'simple' initial situation with regard to our example? Because we have a marketable commodity in our example of drinking water and we have one commercial player, the waterworks, that wants to establish a PES out of economic self-interest. Those who cause the environmental problem, namely the farmers, are known as well.

But what is the initial position for the vast majority of ecosystem services and biodiversity? Imagine, for example, you want to enjoy the beautiful landscape for recreational purposes, linger in a wildflower meadow, climb the mountains or hike through the forest. Usually you can do that without having to pay. In general, anyone who wants to enjoy the beautiful landscape has free access to this cultural ecosystem service. There is, however, no economic player who is prepared to provide that ecosystem service out of his own self-interest. Because if everyone can enjoy the beautiful landscape without payment, first of all, you can't make money out of it. So the money that under certain circumstances must be spent to mitigate harmful impacts on the landscape is absent. A multitude of our environmental problems ultimately emerge not as a result of the use of ecosystem services, as in enjoying the beautiful landscape, but because (commercial) players exert a negative influence on those ecosystem services.

But who qualifies as a financier if access is intrinsically free and the demand is rather diffuse, that is, can neither be clearly pinpointed nor clearly delineated? How can we identify the

buyer or buyers? Under the conditions of free access to benefits, many people are only willing to pay if they can be confident that many users will contribute their share. If that is not the case, they behave strategically and become free riders. This is especially true if the group of beneficiaries is large and anonymous. Another problem is that the financial contributions of private individuals are often far from enough to finance the measures needed to preserve or improve the ecosystem services.

It is here that government enters the game as an important player: Rather than the individual economic interests that lead a commercial player like our water company to make a commitment, the government pursues general interest objectives. To assert those general interest objectives, the governmental stakeholders have economic options available in addition to the possibilities of sovereign intervention described earlier, such as prescriptions, proscriptions, the setting of environmental standards and so on. The government can also act as buyer on behalf of its citizens and thus as a crucial intermediary. And a central role does indeed fall to government in many cases: not only as sovereign regulator, but also as just that intermediate buyer, whom we shall call a financier.

Of course civil society stakeholders (non-governmental and not-for profit) such as environmental associations, community groups or private individuals can also act on behalf of the beneficiaries, and they do. Again, it is not the commercial interest of private individuals that is the driving force behind involvement but the general interest and/or the private (nonprofit) benefit of a social group.

Civil society stakeholders have no sovereign power to act as long-term buyers in the framework of PES, and usually they do not have sufficient financial resources to do so either. Their

strength is that they are often highly motivated and act out of inner conviction, have local knowledge, and are willing to volunteer their time and human resources. The sovereign power they lack can be an advantage in this context as well when it comes to matters of trust and networking.

Classification of PES

The observations have shown that there are many different forms of payments for ecosystem services and biodiversity, depending on the different institutional rules and the stakeholders involved. The user-financed or beneficiary-funded payments described as ideal in the economic theories are only one approach, and so far they have occurred very rarely in practice. This applies all the more if only those in which government plays no role whatsoever are considered ideal user-financed PES, in other words, if PES are seen as real alternatives to governmental action. As we have shown, in many cases government does play an important role with regard to payments for ecosystem services and biodiversity. Therefore, we will distinguish different PES against the background of the role of government, and in the context of our example we also want to pursue the question that keeps coming up about whether service providers and beneficiaries act voluntarily.

Our classification will start with the two major options government has for action: First, it can act as buyer, representing society's demand. We would then refer to it as a financier. Second, it can exert sovereign influence on supply and/or demand, since it can require service providers and beneficiaries by regulatory legislation to provide services and money. Government thereby determines to what extent

		Government regulates supply and demand	
		NO	YES
Government pays	NO	1 Voluntary non-governmental polluter/beneficiary/philanthropist funded payments for voluntary actions	3 Mandatory polluter-funded payments for voluntary actions
	YES	2 Voluntary governmental payments for voluntary actions	4 Voluntary and mandatory governmental payments for involuntary actions

the stakeholders participate voluntarily in the PES. Depending on whether government exercises these options or not, four different types of PES can be distinguished, as shown in the table.

Since we use these types in our book for structuring the practical examples, we want to take a closer look at them and in particular to examine the motivation of the relevant stakeholders.

Types of PES

We use the following types for structuring the practical examples in our book.

Type 1. Voluntary non-governmental payments for voluntary actions

In these PES, non-governmental players are voluntarily, that is, without regulatory pressure, willing to recompense suppliers who take appropriate action, likewise voluntarily, to provide ecosystem services. Government is not directly involved in the PES, but simply provides the general legal framework for the functioning of these voluntary transactions.

There can be different motives behind the willingness to pay on the part of the buyers: It may be that, as in the example of our drinking water, those who finance the delivery of the service are also immediate beneficiaries of the ecosystem service(s). In this case beneficiaries and buyers are identical and are greatly interested in having the agreed services provided. So there is a classic economic motive on the demand side. But buyers can have altruistic motives as well. Then the interests of others or the well-being of the community, including future generations, are the driving force. It may also be that the basis for a PES is simply that people want to preserve nature for its own sake. It is crucial in all of these cases that there is someone who has a major interest in the promised ecosystem services actually being provided or the agreed objectives actually reached when payment is made.

There are also stakeholders, however, who expect to improve their image by paying for biodiversity and ecosystem services. These have a more indirect commercial benefit from the PES. Often, their business activities have negative external effects on ecosystem services and biodiversity. The buyers now wish to

make the payments voluntarily to compensate for those externalities. NGOs can also finance certain measures to improve their image and hence to obtain an indirect economic benefit. In such cases, the self-interest of the buyers is not primarily in the ecosystem services or the attainment of biodiversity but rather in image enhancement. This is quite important for PES, because in this constellation the critical actor who is really interested in ecosystem services may be absent. In reality these interests and motivations of the customers often overlap. As long as the customers are not themselves the beneficiaries of ecosystem services, we speak of financiers and not buyers. This also applies when someone is willing to pay for the preservation of biodiversity for its own sake.

Type 2. Voluntary governmental payments for voluntary actions

Government is a key player in this PES. Ideally it functions as proxy for a diffuse social demand and acts as buyer in that it finances the provision of the service through governmental programs. Beneficiaries and buyers are two different players here, the beneficiaries being roughly speaking the general public. Since the government as financier relies on tax revenue, the beneficiary could on closer scrutiny be equated with the taxpayers.

Governmental PES are nothing new in the environmental field. Governmental agri-environmental programs have evolved in many countries, mostly out of the massive subsidy programs in the agricultural sector. These programs have existed for several decades both in Europe, hence in Germany and the United Kingdom, and in the United States. By virtue of their enormous financial volume alone, they are of extremely great importance

to the protection of nature and the environment in the cultural landscape. The EU, for example, spent nearly € 20 billion on agri-environmental measures in its member countries in the years 2007-2013. It must, however, be critically borne in mind in the context of the PES discussion that it is only in the past few years that these agri-environmental programs have had specific ecosystem services as their objective and could therefore be described as PES. Currently, governmental programs account for the largest proportion of PES world-wide in terms of scope of application. Even such examples as the Pago por Servicios Ambientales, or PSA for short, in Costa Rica, which became known as PES pioneers, are government-funded and not user-financed programs. It is predominantly central inputs assumed to have a more or less positive environmental impact that are defined in the context of these governmental programs. The effectiveness of the programs depends mostly on the local conditions, and in theory participation is voluntary. Governmental programs in developing countries in particular, however, show that payment is made for some inputs that are actually already required by regulatory legislation, for example, the law prohibiting conversion of forest into agricultural land. So the boundary with our fourth type is hazy.

Type 3. Mandatory polluter-funded payments for voluntary actions

As we have shown in our example of the water company and the farmers, PES are not always based on voluntary participation. They can also be imposed by means of sovereign governmental intervention: Government is empowered, for example, to restrict the rights of users by placing limits on pollution. If it allows flexibility regarding the achievement of those limits,

a demand for ecosystem services may arise. This demand cannot be classified as voluntary, since it is engendered by regulatory legislation. It should be borne in mind, however, that a company may quite voluntarily opt for a PES as an alternative to a purely technical solution. In similar manner, a demand for ecosystem services can be induced by the CAP system mentioned earlier, provided the goal can be attained through compensatory measures.

There is another form of regulatory legislation as well: For the United States, we can mention in particular the Clean Water Act and the Endangered Species Act in this connection. Both laws call for a net zero loss of wetland habitats or habitats of species listed as endangered. If someone causes damage to such habitats, they must compensate for the damage in the functional sense. Habitat banking came into being in response to the demand thus generated for appropriate compensation habitats: Providers of appropriate habitats emerge as commercial players. If they have restored wetlands, for example, they can now put them up for sale on the market.

Such payments are mandated by regulatory legislation in Germany as well. Here it is the Eingriffs-Ausgleichsregelung (impact mitigation regulation) of the Federal Nature Conservation Act (BNatSchG) that requires compensation or replacement for any impacts on the ecosystem balance. In response to these requirements, so-called Flächenagenturen (compensation agencies) have evolved which act as suppliers and offer compensation and replacement measures. But environmental organizations and associations can also be the suppliers financing nature protection measures. This kind of payment has even become an important role now for German environmental organizations and associations.

The question that arises here, as in the ideal case of user-financed payments, is to what extent the stakeholders on the supplier or buyer side have a real interest in having the promised ecosystem services actually provided in exchange for the payments: Those who cause damage (in particular commercial enterprises), and are liable for compensation will limit their interest to the regulated area for which they are liable. If in addition this limited interest in the actual provision of services encounters suppliers who are motivated exclusively by commercial interest, it is important to have a third player (a watchdog) verify that ecosystem services and biodiversity are actually provided in exchange for payments.

Type 4. Voluntary and mandatory governmental payments for involuntary actions

In PES of the fourth type, government uses its sovereign power to require the provision of ecosystem services. Here we have a situation in which government prohibits the perpetrators of negative impacts on ecosystem services and biodiversity from committing certain acts and allows no flexibility with regard to the implementation of these guidelines. Restrictions on agricultural use in protected areas are a classic example from Germany. Specific requirements can be laid down in the protected area regulations regarding mineral fertilization or livestock densities. Farmers have the social obligation to comply with such requirements. On the other hand, such restrictions can have major economic implications. For that reason there are a number of examples of government paying for the economic impacts of regulatory requirements, that is, compensating for them financially.

One might of course ask whether such payments have anything at all to do with the PES approach and whether adherence to regulatory legislation should be rewarded. In real life, however, we see hazy boundaries between these and the voluntary governmental payments for voluntary inputs (Type 2): If we look, for example, at some of the programs known as PES in China or even Costa Rica, we see that payments are made there for services that are actually already required by law. It is often difficult to enforce that law, however, and the payments are an additional option for achieving the goals set. Such payments are used in Europe as well, for example to compensate for requirements in Natura 2000 sites or in connection with the implementation of the framework water directive. Hence there is much in favor of considering such payments in connection with the PES discussion as well. In this book, however, this type is only taken up once again in the final chapter, because none of our successful examples correspond to this type.



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Practice Examples. How is it done and who makes it possible?

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Successful examples of PES from Germany, the United Kingdom and the United States

The preceding examination of the PES approach has made one thing clear: It is a complex subject! The environmental problems are multilayered and do not allow linear solutions. On top of that there are issues of property rights, regulatory limits and the importance of information, to name only those. At the same time, several players with different motives and capabilities are involved. How do these actors work together? What are their motives in getting involved? What capacities do they bring to the table? For what environmental problems have successful PES been developed, who was involved and in what way?

We selected three industrialized countries for our empirical studies. They were supposed to have basic commonalities, such as a democratic, constitutional form of government, full-scale environmental legislation and a history of application of governmental agri-environmental programs. At the same time, the selection was made on the assumption that different concepts of the role of government and civil society as well as differences in detail in the design of the environmental regulatory frameworks had produced a wide range of different PES. Another question was whether the differences in principle in the concepts of nature conservation, a more inclusive one in Europe and a more segregative one in the United States, had resulted in differences in the use of PES as well. For while the European cultural landscape is in large measure densely populated and has been cultivated by man for centuries, there is a significantly greater separation between a heavily used and an almost unused landscape in the United States. In Europe, the socially desirable biodiversity and the cultural ecosystem services are

often linked with an extensively used landscape, the cultural landscape. Accordingly, efforts are made to harmonize commercial exploitation and the provision of ecosystem services on the same land. In the United States, however, there is greater separation between cultivated landscapes and mostly unexploited natural landscapes such as the large national parks.

In the course of our research we were able to glean many exciting examples of PES. We would now like to offer you 19 such examples and their stories; 19 examples of how complex social ecological problems have been successfully tackled with the help of PES.

Our success stories have been selected primarily on the basis of two workshops – one in the United States and one in Germany – as well as a series of interviews carried out during a trip to the UK. The two workshops each brought together representatives of governmental and non-governmental organizations who were and still are heavily involved in the implementation and further development of PES in their respective countries – as initiators, public administrators, consultants and the like. These experienced practitioners were asked to designate successful PES in their home countries and then to explain why they considered these examples to be successful. How do they determine that these are examples of success?

The discussion that unfolded on this topic was primarily about the environmental objectives as well as the effectiveness and efficiency of the instrument: A successful PES would achieve a clearly defined environmental objective effectively and efficiently. But a problem soon appeared in the course of the discussion: Many of the identified examples of success have only been initiated in the last few years. The oldest are 30 years old at the most. Can the effects of an instrument already

be seriously assessed on the basis of such a short period for ecosystems? On the basis of some ecological objectives, yes, but not for all of them and not for newer, potentially innovative examples, which should certainly be counted among the successful ones as well. For that reason, additional aspects of the definition of success for PES were discussed together with the experts and the stakeholders in the examples cited. It was found that in addition to high expectations regarding the ecological impact, social and institutional criteria were relevant: that the PES is supported by a large number of stakeholders on both sides, sellers and buyers; that the stakeholders as well as the regional public stand behind the PES; that it inspires other stakeholders to initiate similar projects, or even that it finds ‘real’ imitators. And finally, successful PES should not be a flash in the pan either but should assert themselves as a long-term approach. Not every example meets all of these criteria for success; but most of these aspects apply to all of them.

The examples of successful PES in our book were chosen subjectively, by experienced practitioners and researchers as long-time observers of the scene. And because the issue is so complex and the paths to a solution are so diverse, this selection includes nationwide, in some cases long-standing programs as well as regional projects and small local, very young PES, even some that are just pilot projects. Since the issue of the stakeholders involved was always in the foreground for CIVILand, they are above all examples that are exciting from an institutional perspective and therefore ones in which we see different organizations and stakeholders, governmental and non-governmental, working together. We count among the non-governmental stakeholders non-profit environmental

organizations, dedicated researchers and interested citizens as well as private sector stakeholders.

Apart from the fact that there is at least one non-governmental stakeholder involved in each example, the individual PES differ widely from one another. To classify them for this book, we have fallen back on the types listed in the first chapter and assigned each example to one of those four types. As is so often the case in research, one or the other example will resist being assigned unequivocally to one category. One PES, for example, is financed by both governmental and non-governmental stakeholders and cannot be assigned uniquely to one category. Often, the stakeholders at the local level are creative and take advantage of the range of options to the greatest possible extent to fund the provision of ecosystem services and biodiversity. The border between regulatory and voluntary measures is also often less clear in reality, making it difficult to classify the individual examples. In the end we assigned all those ambiguous PES cases to the type with which we felt there was the most common ground. Where appropriate we indicate the concrete problems encountered in categorizing a specific example.

On the basis of the current type assignments, the situation presents itself as follows: Eight PES are of the “voluntary non-governmental payments” type. Among them are four examples from the UK, three from Germany and one from the United States. We have classified six examples as „voluntary governmental payments“, three German and three American. And we interpret five of the 19 examples to be “mandatory polluter-funded payments“, ones in which the demand is government-motivated. Three of those are American and two are German PES.

Apart from the PES type, we were of course interested in knowing which ecosystem service(s) each example was aiming at, irrespective of any other ancillary benefits. The ecosystem services concerned are pragmatically identified by different colors. The classification always depends on what is formulated in the projects and programs themselves as the specific target:

- protecting and enhancing biodiversity (green),
- providing clean drinking water and/or improving the quality of surface waters (blue),
- carbon sequestration or prevention of carbon loss (brown),
- providing cultural ecosystem services, especially the chance to enjoy the natural environment and relax (yellow)
- enhancing multiple ecosystem services and biodiversity (purple).

To clarify the constellation of the stakeholders we use an illustration in each example that provides a quick overview of the relevant stakeholders and their role in the context of the PES. In this illustration, the final beneficiaries of the ecosystem services are on the left, the service providers on the right. As described in our introductory chapter, ideally the final beneficiaries pay an amount X to the providers for ensuring or restoring ecosystem services and biodiversity by implementing specific measures or providing land. So in a case like this the beneficiaries are the buyers. The service providers are farmers who cultivate their own or leased land and/or landowners, who

include individuals, communities, churches and rural development associations as well as environmental associations and foundations.

We do not find such a direct liaison between final beneficiaries and providers, however, in any of our examples. In all cases, there are players involved who mediate the interchange between the two sides, the buyers and the sellers. We call these players intermediaries. They play a number of different roles: They coordinate the process, advise and recruit providers, are responsible for certifying certain inputs or for monitoring (Figure 1). Also, in many cases intermediaries act as proxy on behalf of the final beneficiaries or on behalf of the service providers: Government agencies, for example, may act as the actual buyer or financier in response to a social demand in the context of agri-environmental programs. We refer to the player who finances the provision of a service on behalf of the final beneficiary and acts as the contracting party in dealings with the supplier as the financier. Apart from the government in the form of an agency, this can be, for example, an environmental organization or a philanthropist. The financier quite often obtains the necessary budget from taxes or levies on the final beneficiary. Intermediaries can also act as representatives of the supply side. In that case we call them suppliers. A supplier represents several service providers, so he bundles the offer, and acts as a direct contact and contract partner for the buyer or the financier. (Figure 2)

There is another aspect that is important to us in connection with buyers and financiers: The demand for ecosystem services can be fostered by governmental incentives. For one thing,

This color coding is reflected in the description of the respective PES.



Figure 1



Figure 2





Figure 3

regulatory requirements can mean that a business uses the services of particular ecosystems (for example, the filter function of wetlands) instead of machinery to reduce its negative environmental impact. In that case the business is the beneficiary and buyer of the services provided by the

PES (Figure 3). On the other hand, the government may pass legislation requiring compensation for negative impacts on ecosystem services and biodiversity. Thus a business that damages ecosystems and biodiversity and hence reduces the benefit to third parties must ensure that activities take place to provide additional ecosystem services and biodiversity elsewhere. In such a case the business acts as financier for a PES (Figure 4).

In addition to this chart showing the relevant stakeholders, there is a short fact sheet providing data on the relevant example. Here the stakeholders are summed up once again, while on the other hand the fact sheet contains information on the region, on the size of the areas addressed by means of the instrument, and on the time frame and financial resources. In addition, we have endeavored to provide a short summary of the key element of the PES concerned: the design of the payment, that is, whether the approach is output-based or input-based and how the amount of payment is determined.

At the heart of the following pages, however, are the detailed descriptions of the examples, in the drafting of which we asked ourselves the following questions: What are the ecological and social backgrounds, what ideas and objectives were

the stakeholders pursuing with the PES and what important steps were taken in implementing it? How does the mechanism work, how is payment made, what for, and how is the amount of payment calculated? And which stakeholders were or are involved with what tasks and how does their interaction work? The descriptions are supplemented in almost every case by interviews or a personal statement. These interviews with the PES managers or people closely involved in them took place between 2011 and 2013. We conducted them either directly on site in the course of our research or by telephone for this book.

At this point we would like to express our gratitude once again to everyone involved for the time they invested and the impressions they shared, some of them very personal. They enrich our texts tremendously and clearly show what is behind every single PES: people with ideas and a high level of commitment.



Figure 4

Overview

PES in the United States

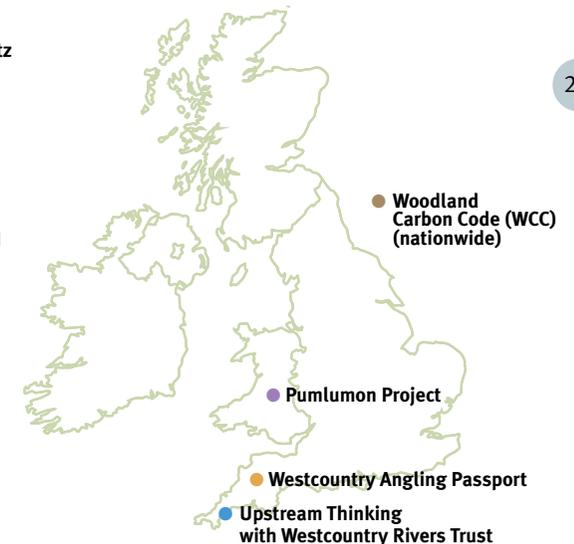
- Edwards Aquifer Protection Program
- Florida Ranchlands Environmental Services Project (FRESP)
- Performance-based Environmental Policies for Agriculture Initiative (PEPA)
- Conservation Reserve Enhancement Program (CREP) in Vermont
- Medford Water Quality Trading Program
- Silvergate Mitigation Bank
- Forest Mitigation Banking in Maryland

PES in Germany

- MoorFutures®
- Trinkwasserwald® e.V.
- Blühendes Steinburg
- Naturschutzgerechte Bewirtschaftung von Grünland in der nordrhein-westfälischen Eifel
- Gemeinschaftlicher Wiesenvogelschutz
- Niedersächsisches Kooperationsmodell Trinkwasserschutz
- Flächenagentur Brandenburg GmbH
- 100 Äcker für die Vielfalt

PES in the United Kingdom

- Upstream Thinking with Westcountry Rivers Trust
- Woodland Carbon Code (WCC)
- Westcountry Angling Passport
- Pumlumon Project



Objective of the PES presented

- protecting and enhancing biodiversity
- providing clean drinking water and/or improving the quality of surface waters
- carbon sequestration or prevention of carbon loss
- providing cultural ecosystem services, especially the chance to enjoy the natural environment and relax
- enhancing multiple ecosystem services and biodiversity

Voluntary non-go

The following examples come closest to the typical notion of PES. In this type of PES, government is neither involved as a key financier nor has it regulated supply or demand. Ideally, it is the direct beneficiaries of the ecosystem service who pay to have them safeguarded or provided.

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Upstream Thinking with Westcountry Rivers Trust, United Kingdom

A water company finances various projects in South West England to improve the water quality in key watersheds. One of the projects was initiated and implemented by the environmental organization Westcountry Rivers Trust: Farmers receive payments if they reduce nutrient and pollutant discharge into waters by improving their land management. This in turn reduces the company's water treatment costs.



Westcountry Angling Passport, United Kingdom

The PES was initiated by the environmental organization Westcountry Rivers Trust and private landowners.

Recreational anglers are granted access to private fishing grounds for

a fee. Beforehand, the owners invested in the upkeep of the waters and the riparian zones to increase the recreational value for the paying guests. Alongside, the overall ecological condition of the water bodies is being improved. Tokens which can be purchased and redeemed through the environmental organization serve as a means of payment.



Edwards Aquifer Protection Program, United States

The City of San Antonio obtains its drinking water primarily from an artesian aquifer. In order to protect this source, land owners in sensitive areas refrain permanently from implementing specific forms of land use. In return, they receive attractive payments financed by an increase in the local sales tax. Residents themselves voted to introduce and continue the program.



Trinkwasserwald® e.V., Germany

The association converts privately and publicly owned areas of forest to increase the natural benefits of groundwater recharge in forests. The planting is financed partly by companies wishing to offset their use of water during production activities.



Governmental payments

Pumlumon Project, United Kingdom

Initiated by the Montgomeryshire Wildlife Trust the PES aims to provide ecosystem services in combination with social and economic benefits. Farmers are encouraged to change their current land management to provide ecosystem services. In order to avoid double funding with government agri-environmental programs, the farmers are paid to maintain the infrastructure that the Trust has implemented.



Woodland Carbon Code (WCC), United Kingdom

The Woodland Carbon Code is the British standard for voluntary carbon credits generated through afforestation projects. Businesses and private individuals can acquire credits to mitigate their emissions.

The afforestation projects are financed through the sale of credits. In addition, they may apply for governmental grants. Specialized carbon companies like Forest Carbon Ltd act as intermediaries.



MoorFutures®, Germany

MoorFutures® is an instrument of the voluntary carbon market developed by the University of Greifswald and Agricultural and Environment Ministry of Mecklenburg-Western Pomerania. Businesses or private individuals may offset their carbon emissions by purchasing certificates. The certificates are generated by rewetting peatlands in the participating federal states to reduce carbon loss.



Blühendes Steinburg, Germany

The Stiftung Naturschutz Schleswig-Holstein and the Local Farmers' Association are testing two innovative mechanisms for PES as part of the pilot project. Farmers are paid output-based for the extensive management of grassland, whereby they must show evidence of indicator species on their fields. The farmers themselves determine the amount of the payment to be received in advance following a tendering process.

In the following we would like to introduce you to some examples that come closest to the typical notion of PES. In this type of PES, government is neither involved as a key financier, nor has it influenced supply or demand through legislation. It can, however, play an important role as an intermediary. Thus we are dealing here with voluntary payments by non-governmental stakeholders for voluntarily implemented actions. In the case of the ideal PES, it is the direct beneficiaries of the ecosystem service who pay to have them safeguarded or provided.

The UK initiative *Upstream Thinking with Westcountry Rivers Trust* can be interpreted as such an 'ideal PES'. Here a water company pays for measures to improve water quality, and directly benefits from it. The situation is different in the examples of *MoorFutures*[®] in Germany, the British *Woodland Carbon Code*, *WCC* for short and the campaign of the German *Trinkwasserwald*[®] e.V. presented in this book: Here companies and individuals offset their carbon emissions and water consumption voluntarily, but there is no direct link between payment for and use of the ecosystem services provided. In the two examples of voluntary offsetting of carbon emissions, the *MoorFutures*[®] and the *WCC*, government also plays an important role as an intermediary by directly or indirectly supporting the sale of credits. In the case of the British *Westcountry Angling Passport* it is once again the direct users, the recreational anglers, who pay for the provision of the ecosystem benefit, namely experience and relaxation. This, incidentally, is the only example where payment is made for a cultural ecosystem service. The German PES *Blühendes Steinburg* is concerned with the protection and preservation of biodiversity. It is coordinated and funded by a public law

foundation, so government is indirectly involved. Here we come up against the limits of our classification. This is even more evident in the last two examples: In the case of the *Edwards Aquifer Protection Program* in the United States the residents of a city pay for the security of their drinking water supply through an increase in the local sales tax. The townspeople voted for the implementation and continuation of the program, so basically they are direct beneficiaries as well as buyers of the ecosystem service provided. The program differs from an 'ideal PES' only in that the city acts as the intermediary financier who collects and distributes the money. The British *Pumlumon Project*, finally, focuses on the provision of various ecosystem services and the protection of biodiversity and receives its funding from a wide range of sources, some non-governmental and some governmental. So this PES could be assigned to both the first and the second category. However, since according to the developers the bulk of the funding is covered by charitable foundations, we have assigned it to the category of voluntary non-governmental payments.



Upstream Thinking

A water company finances various projects in South West England to improve the water quality in key watersheds. One of the projects was initiated and implemented by the environmental organization Westcountry Rivers Trust: Farmers receive payments if they reduce nutrient and pollutant discharge into waters by improving their land management. This in turn reduces the company's water treatment costs.



South West Water (SWW) provides drinking water and waste-water services throughout Cornwall and Devon along with small areas of Dorset and Somerset in southern UK – an operating area of more than 11,000 km² with 1.6 million residents. Around 90 percent of the drinking water comes from reservoirs and rivers. The remainder is obtained from boreholes and aquifers. The main reservoirs are Wimbleball in the east, Roadford in the center of the region, and Colliford in the west. Since 1989, SSW has made substantial investments in environmental improvements to bring the region's drinking water, sewerage systems and bathing waters into line with UK and European Union standards.

Those investments include the Upstream Thinking initiative with a total budget of £ 9.1 million over five years to manage water quantity and improve water quality at its source long before it reaches the water treatment plants. SWW started the initiative in 2008 with a pilot project to restore mires on 326 hectares of protected land. Today, Upstream Thinking is delivered in partnership with a range of organizations, including trusts, governmental

Upstream Thinking with Westcountry Rivers Trust

institutions and universities. The initiative currently funds various projects that help improve land management. One of them was initiated and implemented by the environmental organization Westcountry Rivers Trust (WRT)

WRT was established in 1995 to secure the preservation, protection and improvement of the water bodies in South West England, a region traditionally known as the 'West Country', and to advance the education of the public in the management of water. The trust has therefore garnered a lot of expertise in the development of watersheds and has a long-term working relationship with farmers through the provision of best practice advice and the administering of grant aid schemes. In the Upstream Thinking initiative, WRT also monitors and evaluates the scheme in partnership with various academic groups while further refining the scheme (see next page).

WRT's Upstream Thinking project started in the 90,000 hectares watershed of the Upper Tamar Lake. The area is predominantly granite with rolling farmland valleys and heaths and therefore relatively impervious. The river water levels can rise rapidly and lead to surface runoff and erosion, which in turn affects water quality. About 500 farmers work in the region, using the land predominantly for dairy, beef and sheep production. Most farms have a poor, but legally compliant infrastructure that allows soil particles, nutrients and fecal matter to enter the water courses. Resulting from those high nutrient inputs a



severe blue green algae bloom was affecting the water quality of the Upper Tamar. To prevent this from happening again, the WRT, initially as part of a pilot project, offered interested farmers financial assistance if they changed their farm infrastructure and their land management to improve the water quality. Due to the success of this pilot project, it was extended to the Wimbleball and Roadford lakes, as well as to the major river basins of the rivers Exe, Tamar and Fowey. Some £ 4 million are currently available for the WRT's Upstream Thinking project.

The money is used to encourage farmers in these areas to improve their land management through capital investment in the kind of infrastructure that will reduce the likelihood of pollutants from the soil and animals reaching watercourses. The payments are based on activities and developments carried out on a specific farm. Operations are discussed in person and incorporated into the farm plans. Examples of farm infrastructure improvements include fencing to create buffer strips and keep the cattle away from the catchment, building a slurry pit or a roof over their manure store. Farmers could also reduce the livestock or improve their pesticide management techniques.

Farmers are required to cofund the investments, usually by 50 percent. Additionally, farmers sign a contract detailing the restrictions placed on their farming operations, for instance, one that restricts the maximum number of livestock. The contracts between WRT, SWW and the farmers run either ten years or twenty-five years. This is based on the economic life of the farm infrastructure improvements. The longer contracts are actually covenants that ensure the improved farm infrastructure usage and specific land management practices will continue even if ownership of the farm changes hands.

There is no direct contact between the beneficiary and the service providers, the WRT acts as an intermediary. Accordingly, the development of trust between the single buyer, SWW, the intermediary and the numerous sellers was crucial to the success of the scheme. Another challenge was to understand that the Upstream Thinking grants run in competition with other grant schemes also available in the same watershed. Some of the farmers are concerned about losing valuable farmland and limited food production. To mitigate those concerns, the WRT works on improving overall farm wide efficiency.

Other projects implemented under the Upstream Thinking initiative of SWW are the Dartmoor Mires project, Exmoor Mires project, Working Wetlands and the Wild Penwithm project in collaboration with other environmental organizations like Devon Wildlife Trust, Cornwall Wildlife Trust, Exmoor National Park and Dartmoor National Park. The focus of those projects is the restoration of wetted peat moorlands and floodplain wetlands. In all the Upstream Thinking projects, the main aim is to improve the water quality and thus reduce the utility's water treatment costs. Additionally, the initiative provides other positive impacts on biodiversity and ecosystem services, like the reduced risk of flooding. The farmers (to date about 400) also benefit from improved farming infrastructure and land management. Though the payment is not based on the actual water quality (this is under review), it is a cost-effective and environmentally friendly way of dealing with the long-term problems confronting the water industry.

Upstream Thinking with Westcountry Rivers Trust

Region (area):

Watersheds in South West England, United Kingdom (about 100,000 ha)

Starting year (stage):

2008 (ongoing)

Objective:

Improvement of water quality

Beneficiary:

South West Water

Service provider:

Farmers represented by the Westcountry Rivers Trust

(Other) Intermediaries:

Universities like the University of East Anglia, governmental institutions, other environmental organizations

Budget:

2010-2015: £9.1 million for the whole program; £4 million for the project of the Westcountry Rivers Trust

Payment arrangement:

Input-based; level of payment is based on opportunity and production costs

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www.southwestwater.co.uk

WRT, SWW and the University of East Anglia are working together on a further improvement of Upstream Thinking.

The goal is to develop a PES scheme where farmers bid for funding from SWW in a 'River Improvement Auction'. The scheme was piloted in the River Fowey watershed in summer and fall 2012. SWW provided £ 360,000 for the reverse-auction process. About 50 percent of all eligible farmers participated. They made bids that were double of what the regular scheme made available – therefore there seems to be a significant potential for improvements of land management. At the same time, the cofinancing of farmers was in the accepted bids for only 40 percent, rather than as part of the regular project, 50 percent of the material costs.

There are a number of other similar water quality programs active in the UK.

The first PES funded by the British water industry started in 2005 and was called Sustainable Catchment Management Project (SCaMP). Here, the United Utilities water company, supported by civic organizations, created a PES under which farmers received payments for improving their operational areas; for example, by demarcating grazing land from river basins, or by building shelters. The difference to the Upstream Thinking initiative is that United Utilities is not only the financier of the PES here, but also the owner of the land on which the measures are implemented. The farmers are in effect the tenants of the utility. United Utilities provides two-thirds of SCaMP's financing, which is in turn funded by the end-user via an increase in water prices. The remainder is financed through government agri-environmental programs. The long-term goal of the utility is to transfer as many farmers as possible to government assistance programs, and therefore not be permanently burdened with the costs. More information at: www.unitedutilities.com/scamp.aspx.



*Interview with Laurence Couldrick
from Westcountry Rivers Trust,
Upstream Thinking Project Manager
and Head of Catchment Management*

What do you think is important for a successful PES scheme?

We've spent a lot of time studying the global PES examples to see where they fall down. This happens when there is no trust and when you can't apportion between multiple services. It's quite clear: You've got the uncertainty of providing services, which is where trust comes in, and you've got the difficulty of apportioning between services. So that third sector, that middle ethical broker, is very important, and it's fine if you're providing a single service. I think Upstream Thinking is a perfect example for a PES working and working well but it is a single service we are focused on. It brings in other ones as a by-product but it is not a multiple PES.

How did WRT build up this trust?

It's taken us 15 years to build the relationship with the farmers because we said: We are confidential. So we don't report anything we see to the environmental agency. So they were instantly at ease. We are not here to say: Save the fish, save the environment. We're here to help you as a business, make you more sustainable, find you grants, so on and so forth. Everything we say to you is voluntary, so you can pick it up or you can leave it. So that, plus the same people. We've had advisors who've worked with farmers for the last 10 year, the same person.

The same goes for governmental organizations, like the environmental agency. We had to gain their trust by showing them we know what we're doing. It takes a long time. This is why, a consultancy, someone coming in overnight, can't do it because they don't have that trust. If they have enough money to circumvent that, so that they can give 100 percent funding out, they might not get the service back because the farmers will say: We'll take your money, but whether I give you the service or not you'll have to come back. And you'll basically get on to that regulation side where you need someone to enforce it.

SWW had the ability to enforce but the reason why we spend so much time visiting the farmers and working with them is to try to impress on them what they are doing for SWW, why they're putting these things in place. So it's actually explicitly the service 'better water quality' that they are giving. If they are then coming out of it and going: I'll thrash everything again; then we'd have to go back. And so that's why, knowing the farmer and knowing what they will and won't do, dictates what to advise and not to advise. If we know that they are very environmentally savvy, and very switched on and know their business, we can advise quite technically detailed things. If we don't, if we think they are sort of having trouble and don't really have the knowledge and ability, we'll give them very basic and easily enforceable things, i.e. don't farm that, and don't put that into maize. The negativity comes with people who don't like being told what to do on their land. But we don't force them. Nothing's forced. It is just the fact that what we're saying: Currently you're doing stuff that degrades the water quality, and what we would like to give you is money to try to prevent that. Now if you want to carry on, that is up to you.



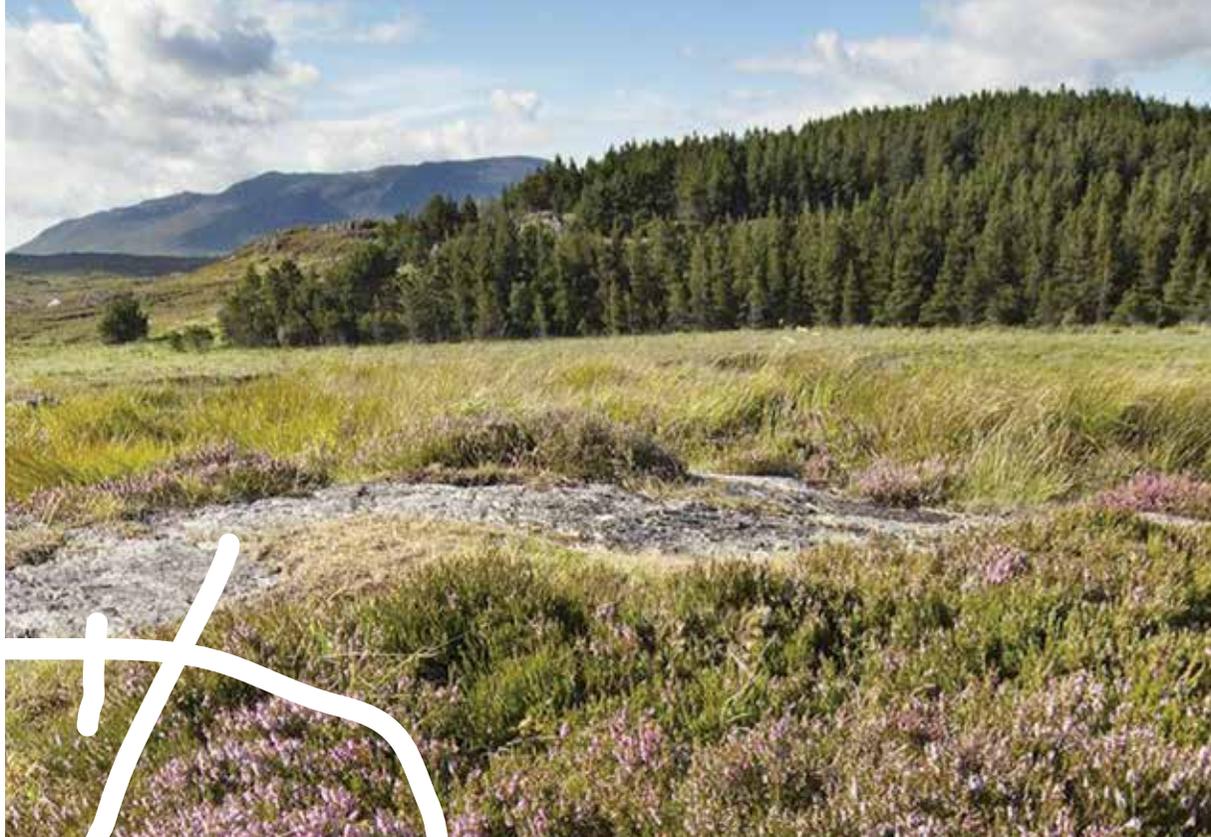
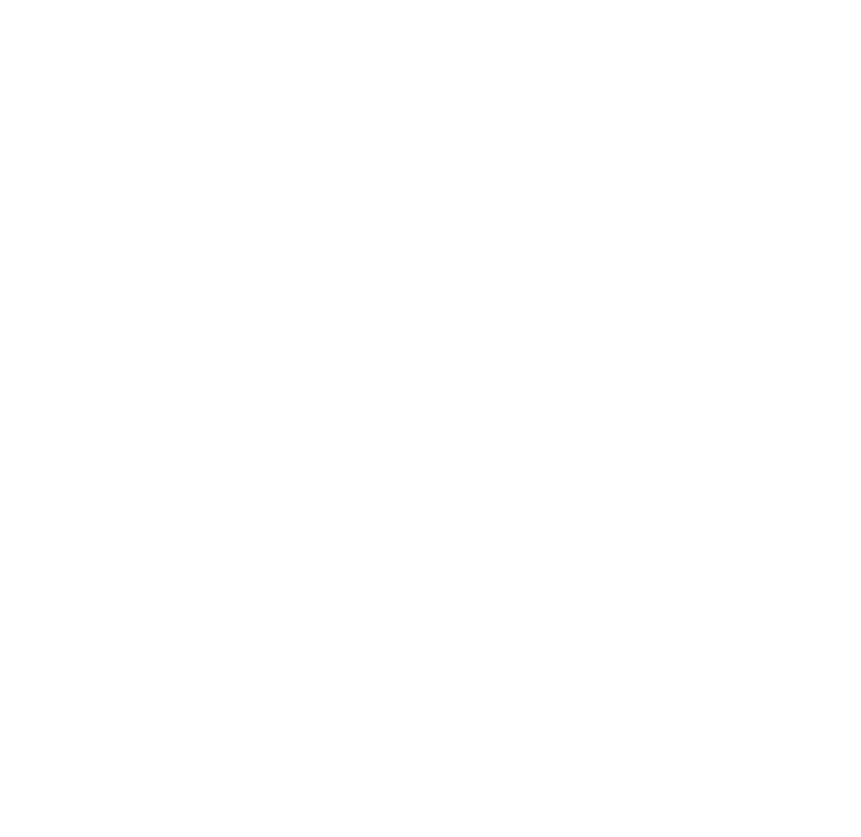
Given the limited funding, how do you optimize your outreach to farmers?

Sometimes we'll get enough funds to look at the whole area, so we see and advise every single landowner. In other areas, we'll prioritize and target them, as we haven't got enough money to see every farmer. We often prioritize based on our own knowledge. You do that by looking at the water quality of the sub-catchments to see which are worse than others. But we're also looking at tools for targeting. Another thing is to look at the sources of some of your pollution, their pathways, how they get to the river and the receptor, where they get in, and this sort of pollution level mobilization connectivity, to give you pollutant risk. It's a good way to start modeling that in GIS. You can then add that into land use and start saying how risky any land use might be, and you can vary this layer, which allows you to generate the sort of map that tells you where the risk of having soil and sediment getting into the river is higher. It's a way of targeting within a catchment.

So you talk to farmers about how you can look at the land, the areas of erosion risks and why they might be a problem and what we can do about solving them. It's just that way of knowing how much money, whether you're targeting, whether you can cover everywhere. But no amount of modeling or mapping will show you exactly what happens on the ground. Every case is different, and the first thing the advisor talks about isn't the land, the infrastructure, it's: What's your business? What are you doing? Are you going to retire in the next five years? Where are you, what's your goal? All of those sorts of questions, because everything stems out of that discussion. So you've got to know that first.

Do you have a vision for the future of Upstream Thinking or PES in general?

I would love to have a genuine multiple PES, with multiple buyers, multiple sellers and then us in the middle, being able to have the trust and the tools to apportion and the people to trust that apportioning. That for me is the future, and to see whether we can genuinely get that. I generally believe we can't succeed here with this sort of relationship because we don't have enough scientific certainty over the data to be able to prove it out right to everyone. So it's going to have to be based around trust and understanding about what government can do and can't do, and what businesses can do and can't do. The stuff that SWW is doing is not because of the fact that they want to save the world. It is because they want to save more money and make more money. So if they didn't think it was going to work, they wouldn't invest in it. On the river Fowey, farmers spent about more than 100,000 pounds a year on pesticides in there. Yet it is going to cost SWW eight million pounds to set up an activated carbon treatment plant down there, and it would cost a further, like, I think it's 250,000 pounds a year to run it. Ridiculous!



MoorFutures®

MoorFutures® is an instrument of the voluntary carbon market developed by the University of Greifswald and Agricultural and Environment Ministry of Mecklenburg-Western Pomerania. Businesses or private individuals may offset their carbon emissions by purchasing certificates. The certificates are generated by rewetting peatlands in the participating federal states to reduce carbon loss.

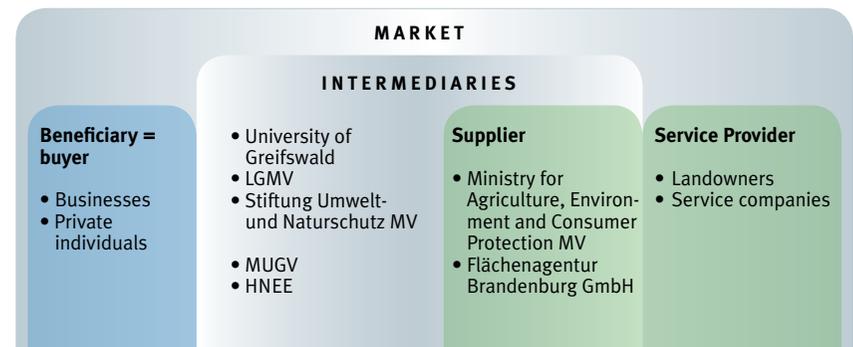


The peatlands of Mecklenburg-Western Pomerania have been the focal point of the state's climate protection activities since the 1990s. Nearly 13 percent of the state's land, or about 300,000 hectares, is comprised of moor soils, especially low-lying peatlands. Large tracts of these areas were intensively drained during the period of industrialization and are now used for agricultural and forestry purposes or peat extraction. **In addition to the negative impact the draining had on specialized animal and plant species as well as soil and water quality, it also led to an increased release of carbon dioxide and nitrous oxide. With the rewetting of peat soils, these emissions can be greatly reduced, thus making an important contribution to climate protection.**

The MoorFutures® project, initially known as Mooranleihen (MoorBonds), was first referred to in 2009 as part of the "Konzept zum Schutz und zur Nutzung der Moore" (Concept for the Protection and Use of the Moors). The aim of the project was to usher in a period of climate protection that combined species- and biodiversity protection in the peatlands. The success of a previous project, Waldaktie (ForestShares), in

which holidaymakers to Mecklenburg-Western Pomerania could offset the greenhouse gases emitted during their trip over the long-term by paying for the reforestation of about 10 m² of forest (www.waldaktie.de), was to be extended to another form of natural carbon sequestration. The new project was to focus mainly on business enterprises and the rehydration of peatlands in the region. MoorFutures® was the result – jointly designed and developed by the Ministry of Agriculture, Environment and Consumer Protection of Mecklenburg-Western Pomerania and the University of Greifswald. Following the concept's commissioning in September 2011, the first actual rewetting project for Mecklenburg-Vorpommern started in the summer of 2012. Cooperation with the State of Brandenburg was arranged in May 2012, and in December 2012, that state commissioned its first project.

In both states, businesses and private individuals can now utilize MoorFutures® to offset the emissions caused by anything from single business trips to entire production processes, and thereby improve their greenhouse gas balance. The emission certificates are offered on the voluntary carbon trading market. The PES relies on regional commitment: the funds from the certificates help pay for regional rewetting projects on tracts of land close to the purchasing businesses.



A MoorFutures® emission certificate equates to a saving of one tonne of carbon dioxide, which is achieved over a period of 30 or 50 years. The price of a certificate currently lies between € 30 and just under € 70, depending on the project area and term. The price includes the full cost of the rewetting measures, as well as the costs for planning, water permit procedures and compensation for landowners and tenants. The personnel cost for the organization in Mecklenburg-Western Pomerania, namely the staff at the Ministry, the university and the other organizations involved, are not factored into the price since these expenses are borne by the institutions themselves.

The MoorFutures® Standard was devised to generate the certificates. It was based on the Verified Carbon Standard and the provisions of the Kyoto Protocol. The standard defines the criteria for generating certificates as well as for validating and monitoring the projects. The amount of carbon emissions saved compared to conditions before the rewetting is calculated using the Greenhouse Gas Emission Site Types (GEST) approach. The University of Greifswald developed and continues to refine an indicator model for the greenhouse gas balance that uses specific plant communities forming due to the different water levels on the land.

The area for the projects is permanently secured using two methods: Either it is acquired for the benefit of earmarked projects carried out under the auspices of the Stiftung Umwelt- und Naturschutz Mecklenburg-Vorpommern (MV Foundation for the Environment and Nature Conservation). Alternatively, if owners do not wish to sell their land, easement agreements may be entered in the register of deeds. These easements stipulate the water level requirements even when a change of ownership takes place. In the second case, the landowner

receives payment of an amount that is primarily determined by the current local rents and the contractual period.

Information about the location and status of the area as well as the calculated emission reductions is available for every rewetting project. Registered serial numbers and entries in a project registry identify the certificates and clearly assign them to specific projects. It is also possible to visit the areas at any time to determine whether changes or improvements can be made. The buyer is also offered additional services, including training seminars and management training courses on the peatland.

In Mecklenburg-Western Pomerania, the University of Greifswald is responsible for the scientific monitoring of land development, while the State Ministry is responsible for marketing, public relations and settlement coordination. Another important partner is the Stiftung Umwelt- und Naturschutz Mecklenburg-Vorpommern, which oversees the peatland funds and acts as the contact partner for purchase transactions. The Landgesellschaft Mecklenburg-Vorpommern is involved in the search for project areas, the approval process, the supervision of the areas, and the payment to the landowners. In Brandenburg, the Eberswalde University for Sustainable Development carries out the scientific assessment and monitoring of the MoorFutures® projects, while the professional preparation, implementation and long-term management of the land is performed by the Flächenagentur Brandenburg GmbH.

The MoorFutures® program is considered one of Germany's prime examples of a successful PES. The online project registry shows that the emission certificates have been purchased by regional companies including the energy supplier WEMAG AG along with local tourism providers, large

MoorFutures®

Region (area):

Mecklenburg-Western Pomerania and Brandenburg, Germany (about 55 ha + 13 ha)

Starting year (stage):

2011 (ongoing)

Objective:

Prevention of carbon loss

Beneficiary:

Businesses and private individuals acting as buyer

Service provider:

Private landowners and service companies represented by the Ministry for Agriculture, Environment and Consumer Protection Mecklenburg-Western Pomerania or the Flächenagentur Brandenburg GmbH

(Other) Intermediaries:

University of Greifswald, Landgesellschaft Mecklenburg-Vorpommern mbH (LGMV), Stiftung Umwelt- und Naturschutz Mecklenburg-Vorpommern; Ministry for the Environment, Health and Consumer Protection Brandenburg (MUGV), Eberswalde University for Sustainable Development (HNEE)

Budget:

Currently about € 500,000 in Mecklenburg-Western Pomerania, € 450,000 in Brandenburg

Payment arrangement:

Output-based, level of payment is based on the cost of securing land and production cost

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www.moorfutures.de

companies like Volkswagen Leasing GmbH and McDonalds Germany Inc., as well as by private individuals, foundations and environmental associations. Occasionally, however, the project initiators have encountered criticism and acceptance problems, particularly among affected farmers and municipalities. They see their existence threatened by the rewetting programs being enacted so close to their homes and feel left alone with the possible hazards of elevated groundwater levels.

Additional services provided through peatland rewetting have been recorded as part of a research project that was funded by the Bundesamt für Naturschutz (BfN, Federal Agency for Nature Conservation) and completed in early 2014. This now allows statements for the improvement of biodiversity and water quality in particular. Thus, the so called MoorFutures 2.0 are the first peatland emission certificates that integrate other ecosystem services.

A glittering trap for insects:
sundew in the bog.



*Interview with
Dr. Thorsten Permien,
Unit Head of the Ministry of Agriculture,
Environment and Consumer Protection
Mecklenburg-Western Pomerania*

*“For the near future, I would hope that
the ‘peatland states’ of Germany agree to
band together and develop this interesting
topic further.”*

To a certain extent the MoorFutures® are based on a different project that you initiated – the Waldaktie. What was the intention behind that project?

The thinking behind the Waldaktie was: Could we succeed as a leading tourism destination to create an attractive link between tourism, environmental education, education for sustainable development and climate change? The Waldaktie developed as a result of that, and it was primarily designed for the end consumer, or tourists in this case. For 10 euros, 10 square meters of nearby national forest would be reforested in accordance with State Forest Law. This means, among other things, that state forest agencies shall be obligated to support forest regeneration out of their own resources following an emergency like a bush fire, for example. That's the promise we give the forest shareholders: 10 square meters will be reforested and sequester carbon, which is a fact! Two important implementation partners in the Waldaktie are the Tourism Association of Mecklenburg-Western Pomerania and the Landesforstanstalt (National Forest Institute). Actually, the whole thing started as a marketing gimmick for the tourism season in 2008, but then it became a great success.

Why is that?

This definitely has something to do with the fact that Mecklenburg-Western Pomerania is viewed very positively in the context of tourism, and also that the Waldaktie is linked with the positive cultural connotations associated with forestry. So two positive things: tourism and forestry. And I also think that the chance to collaborate by planting a tree yourself is extremely important. The region where the 'climate forest' is located is certainly connected with that; but still, the planting in itself is a

highlight on the tourist calendar. It has become a special event, and is reported as such by the regional press. In the meantime, however, we've had numerous companies join the Waldaktie, and on the other hand, private individuals have bought MoorFutures®.

What do you think has brought about the success of the MoorFutures®?

The success of the MoorFutures® probably stems from the fact that it is so far the only emission certificate that's based on the rewetting of peatlands and sold on the voluntary carbon market. With this step we've moved away from a traditional sponsorship approach towards the actual sale of a service: emission reduction via rehydration. And there are companies who say, man, that's great! There we are with the first people doing this and they're creating it with us. Another reason is the regional implementation. That's similar to a weekly market, which is not like an anonymous market, but one that is characterized by trust. And for this trust-based weekly market we have a Ministry that says: You'll get a government guarantee that what we sell will be vouched for.

What were the particular challenges associated with the implementation of the project?

Trying to convince people. Generally the communication challenge was high, and it's far from being over. This applies to competition for land, for example. We developed the Mecklenburg-Western Pomerania peatland protection concept from a technical perspective with different objectives, some of which will run to 2020. In addition, there was a working group in which the farming community, our ministry with its various



Vikings and Germanic tribes used the intensely fragrant Labrador Tea to add a bitter note to their beer. Today, the evergreen plant is very rare in Germany.

departments and of course other academic institutions, were all represented. The formulation of the objectives was heavily debated there. Secondly, there was and still is the communicational challenge to make clear that peatland protection also means protecting the climate. It's always great when people see a tree growing. Forestry has a very positive cultural connotation. The peatlands are different though. Here people in principle only see a field being flooded and then nothing more to begin with. Nothing grows initially so people think: There's my carbon in there, that's where the sequestration is taking place. Ultimately, the peatlands are primarily there to reduce emissions, and that's not easy to demonstrate. And the project, just like the whole voluntary carbon market, is also pretty controversial, similar to the Waldaktie: There are those who consider it a great project with opportunities, and there are others who think that we're giving people a guilty conscience and contributing to 'greenwashing'. Which is much easier to respond to with the forest than with the peatlands, simply because the forest is viewed positively, with this kind of 'Bambi effect'.

For both projects, I am being increasingly asked whether this is a ministerial task. Should we not do without such voluntary tasks as a small ministry? After all, we've made significant staffing cuts in recent years.

Were, or are, the political and legal conditions for the project more supportive or more obstructive?

I can't answer that question with a clear yes or no. There is a lot that's new and had to be designed from scratch: There was no emission certificate before the MoorFutures® that was based on rewetting peatland. There are constantly new developments at both the international and federal level that we need to follow and perhaps apply to the MoorFutures®. I have already mentioned the competition for land. And then there are the typical standards: Many people know, for example, the Gold Standard, which promises high quality even if only because of the name. Shouldn't projects in Germany be at least Gold Standard deluxe? These standards were developed primarily for offsetting projects on other continents. They should guarantee the quality of projects in countries that might not have the same legal infrastructure that Germany has. If I, for example, have a planning approval process related to water rights that's to form the basis of approval for a rewetting project, then there are many things already written that I don't have to additionally regulate in a standard. Standards also serve the goal of 'exporting' what are self-evident security rights in Germany to other countries. We left this duplication out when we developed the MoorFutures® Standards. That made it possible for us to offer the product for less than it would have been otherwise.

How do you see the outlook of the project? What's your best-case scenario?

From my perspective, it would be great if both projects and instruments – including the Waldaktie – and perhaps other instruments could all contribute to representing and making perceptible the ecosystem services provided by the State of Mecklenburg-Western Pomerania. In 2007, in a study by the magazine GEO, 16 federal states were ranked on the basis of who implements the most effective climate protection. Mecklenburg-Western Pomerania came out on top because we have a sparse population here without the money for big cars or long-distance travel, coupled with a weak economy. You're not necessarily going to find allies for climate protection here that way. My wish would be that these market-based instruments even form the basis for considering nature services, namely ecosystem services, in discussions and negotiations about economic issues. The service a state like Mecklenburg-Western Pomerania performs at the ecological level for the Federal Republic should be recognized as such, i.e. as a service. But that's still a long way off. For the near future, I would hope that the 'peatland states' of Germany agree to band together and develop this interesting topic further. Brandenburg and Mecklenburg-Western Pomerania look forward to making more partners.



Woodland Carbon C

The Woodland Carbon Code is the British standard for voluntary carbon credits generated through afforestation projects. Businesses and private individuals can acquire credits to mitigate their emissions. The afforestation projects are financed through the sale of credits. In addition, they may apply for governmental grants. Specialized carbon companies like Forest Carbon Ltd act as intermediaries.



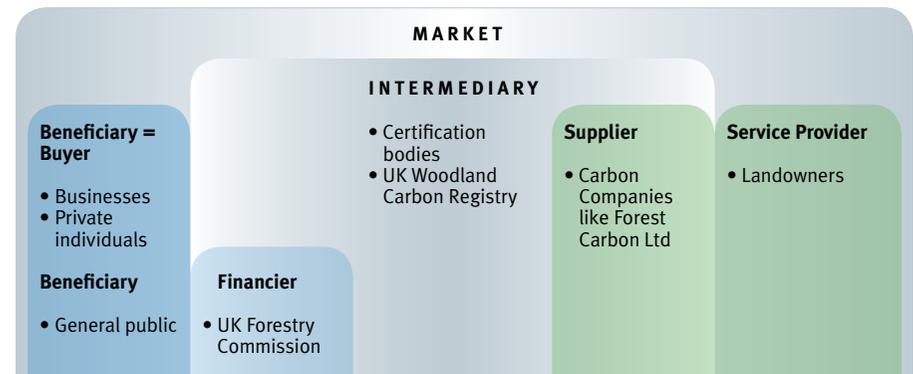
Native woodland covers around 10 percent of the United Kingdom, an amount far below that of other European countries. Not surprisingly, various efforts have been made to increase this amount up to the UK government target of 12 percent by 2060 through land afforestation. One such effort is the government-backed Woodland Carbon Code (WCC) initiative that started in July 2011 aimed at those operating on the voluntary carbon market. The code provides standards for the creation of carbon-funded woodland, and is intended to offer assurances to businesses looking to invest in such projects as part of their carbon mitigation programs.

The value of forests is becoming increasingly recognized, and many private individuals and businesses wish to contribute to tree-planting schemes that help society soak up the carbon it emits. Woodland creation is a cost-effective way of sequestering carbon dioxide. In the process, it also delivers significant additional social and environmental benefits. The WCC sets out project-design and management requirements

to woodland carbon projects and offers assurance and clarity to customers about the carbon savings that their contributions may realistically achieve. It thereby seeks to bolster market confidence in forest carbon projects and increase private investment in forest creation.

There are many woodland carbon projects across the UK where the WCC is involved. As of December 2013, 63 projects were validated under the WCC covering an area of 2,500 hectares, with a projected sequestration of 1.2 million tons of carbon dioxide over their lifetime of up to 100 years. A further 129 projects are registered and not yet validated, with a carbon capture potential of another 4.4 million tons of carbon dioxide if they pass validation. Most of the 192 registered projects are in England (109) and Scotland (74). Very often specialized carbon companies act as brokers between landowners and carbon buyers. They address potential buyers and landowners, develop and coordinate the projects, provide certification, and manage ongoing monitoring.

The first-ever certification under the WCC, in September 2011, was a project located at Milton of Mathers Farm near Montrose, Angus, on the east coast of Scotland. This woodland project was developed by Forest Carbon Ltd (www.forestcarbon.co.uk), the UK's leading developer of voluntary UK forestry



code (WCC)

carbon credits and accounting for 47 of the 63 validated projects at December 2013. At the Milton of Mathers site, new riparian woodland for wildlife, amenity and recreation was planted on 17.4 hectares of land previously used as pasture land. The new woods follow the course of two small valleys (the Den of Lauriston and the Denfinella) and their brooks that meet on the coast at Mill of Mathers.

The project was cofinanced by The Green Insurance Company (TGIC) and the grant the farmer received from the Scottish Government to help create the wood. To meet its mitigation commitments to its customers, TGIC bought the woodland's lifetime carbon sequestration in advance, and then used this to balance its customers' car emissions as part of their vehicle insurance policy.

The new woodland was fenced to keep out cattle from the farm, and all the trees and shrubs were protected by shelters so that deer and rabbits could not feed on them easily. To ensure that the trees establish, weeds were removed and saplings that did not grow were replaced. There will be about 1,600 plants per hectare by the time the site really resembles woodland and the canopy closes. However, plenty of open space has been left to allow for walkways around the new forest and an archaeological site within the area. The new woodlands are managed with a minimal amount of intervention, i.e. by maintaining access and removing small amounts of firewood. An estimated 6,662 tons of carbon dioxide will be sequestered for TGIC's customers over 70 years, and this amount is underwritten by the Woodland Carbon Code pooled buffer and Forest Carbon's own in-house buffer.

Forest Carbon Ltd worked as initiator and broker, and negotiated the contract between The Green Insurance Company

and the farm owners, J D Reid & Partners. It also conducted the estimate of future carbon capture levels and steered the project through certification under the WCC. **In all their projects, Forest Carbon Ltd provides ongoing marketing support, arranges and hosts site visits, and offers access to its in-house carbon buffer stock to insure the projects for credit buyers. Additionally, Forest Carbon Ltd can provide project funding to allow schemes to proceed where no carbon buyer is yet identified, taking ownership of the carbon credits for later re-sale.**

Any private or public landowner who wishes to contribute to climate change mitigation can participate. At present, the code only covers new woodland creation but it is evolving all the time and may extend to improved forest management in the future. To meet all requirements, each project must include long-term objectives and management plans in its certification documentation. It has to meet national forestry standards and use standard methods for estimating the amount of carbon sequestered.

After certification, projects are monitored on a regular basis to ensure that woodland establishment is successful, and that tree growth rates are consistent with the predictions of the project's carbon sequestration. This also alerts project managers to take action if growth is not progressing as expected. The Carbon Assessment Protocol details five different methods of measuring the volume of timber (and therefore mass of carbon) in a woodland. Projects employ it as a guide to determine which method to use for a particular woodland or situation. Additionally, estimated carbon sequestration is guaranteed through (i) UK law that protects forests very stringently and (ii) the creation of healthy project buffers as part of the methodology and the creation of a pooled buffer, meaning certified projects will all insure one another.

Woodland Carbon Code (WCC)

Region (area):

Unwooded areas in the United Kingdom (as of December 2013 about 15,200 ha are covered by registered projects)

Starting year (stage):

2011 (ongoing)

Objective:

Carbon sequestration

Beneficiary:

Businesses and private individuals acting as buyer as well as the general public represented by the UK Forestry Commission

Service provider:

Landowners represented by Carbon Companies (project developers) like Forest Carbon Ltd

(Other) Intermediaries:

Accredited certification bodies like SGS and SFQC, the UK Woodland Carbon Registry hosted by Markit

Payment arrangement:

Rather output-based; level of payment is based on opportunity and production costs minus subsidies

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www.forestry.gov.uk/forestry/infd-84hl57

All external audits, including initial project certification and ongoing periodic verification, are carried out by two independent companies – SGS and SFQS – accredited by the United Kingdom Accreditation Service. Each carbon unit equals a ton of carbon dioxide that has been sequestered during the project's life. Each credit from a forest has a 'vintage', a period when the carbon is expected to be captured. The carbon units are tradable but there can only be one 'end-user' for each carbon unit in its life. The UK Woodland Carbon Registry, operated by Markit Environmental Registry (www.markit.com), indicates the current owner of each carbon unit. The registry also ensures open and transparent project registration as well as Woodland Carbon Unit issuance, tracking and retirement.

The price of carbon for purchasing companies and private individuals varies according to project type, species mix and location, but does not reflect the true costs of woodland establishment. Projects that sign up to the WCC can claim a woodland creation grant in England, Scotland, Wales and Northern Ireland as long as the additionality criteria is satisfied: In order to demonstrate additionality, a minimum contribution from carbon finance to total project costs is set at 15 percent. This element of state cofunding for projects means that the price of carbon to the buying company would, on average, be less than £ 10 per ton.

Under the Government's GHG Reporting Guidelines, companies can report the carbon sequestration resulting from WCC certified projects against their net emissions, and thereby contribute to the United Kingdom meeting its greenhouse gas emissions reduction commitments. However, the projects do not generate internationally tradable credits that comply with regulatory carbon offsetting schemes like the European Union Emissions Trading Scheme.



Milton of Mathers near Montrose, Scotland, United Kingdom

A few days in Berlin – January 2013

Steve Prior from Forest Carbon Ltd reports on developing a Peatland Carbon Code.



I spent the last week of January in Berlin sharing ideas with scientists and policy makers from the UK, Ireland, Germany, the Netherlands, Poland and elsewhere. It was all about our peatlands. For the three days, there were about forty of us all working on the next draft of Germany's MoorFutures standard as well as the development of a possible UK Peatland Carbon Code. I gained the impression that both the UK and the German codes are well on their way to being credible carbon crediting mechanisms for voluntary buyers.

Forest Carbon Ltd was invited to contribute because of our experience in the field. As an 'architect' of the UK Woodland Carbon Code and advisor to the UK's first private peat carbon transaction in 2011, our company is familiar with the demands and challenges of the tasks involved. But in Berlin, in the company of many experts, I learned a great deal more about the scientific and policy developments taking place for the restoration and protection of peatlands for carbon capture, biodiversity enhancement and water purification. I particularly enjoyed this workshop for its relaxed and open atmosphere. In such a setting our debates were allowed to be honest, vigorous and, as a result, enlightening. There was a constant sense of progress.

In comparing a woodland carbon code with a code for peat, I talked about common underlying principles, i.e. the need to ensure that projects are environmentally sound, that carbon estimates are accurate, that projects can be shown to have pro-

ceeded only with carbon funding, and that a project doesn't give rise to some counter-balancing emissions elsewhere. We also discussed the major difference: whereas woodland creation is about greenhouse gas capture, peatland restoration is primarily about avoiding greenhouse gas loss. Forests constantly capture carbon dioxide through photosynthesis and store it, whereas peatlands have already completed this work and, if healthy, keep the carbon locked away (whilst also continuing to capture it at a very slow rate). Our drying, degrading peatlands are reversing this process and releasing their greenhouse gases back into the atmosphere, but restoration through rewetting, and protection, will prevent this loss.

This distinction between carbon capture and avoided carbon loss could lead to an altogether different type of carbon credit for peat projects, based on the concept of permanence.

Carbon dioxide captured by new forests needs to demonstrate its permanence by guaranteeing the trees will be in place for a long (long) time. In the UK, this occurs because we have (a) long contracts protecting the trees under the Woodland Carbon Code (50 to 100 years), and (b) a UK law that presumes against felling and requires replanting if felling is permitted.



However, carbon dioxide emissions avoided (as would be the case with restored peatlands) are deemed to be permanent at the point of avoidance. For example: if you decide to Skype a conference call instead of several people traveling to a meeting then, as you can't go back in time and make the journey, the emissions avoided are permanent. The same logic could be applied to peat: if you rewet a peatland, you are forever avoiding the emissions that would have taken place, and even if you later drain the peat again, you can't go back and emit what was avoided.

The attraction of this line of thought is that it may help to solve one of the potential problems faced by peat carbon projects. With woodland projects it is generally not difficult to get landowners to sign up to long-term contracts because new forests offer so many obvious aesthetic, environmental and utility benefits to landowner and neighbors. It occurred to me that a peat carbon project may not need to demand such long-term contracts because its carbon is already stored, and the restoration offers immediate permanently avoided losses. This is helpful because, unlike woodland project hosts, the owners of large areas of peat are harder to persuade when it comes to signing contracts that prohibit them from utilizing their land long-term. I believe that shorter contracts – say ten years' duration or more – could have a role to play in the future. If shorter contracts lead to an increased willingness of landowners to participate, we could see peatland restoration taking place on a much larger scale in the short term, which is when it is most urgently needed. In the future, as landowners gain confidence in the projects and in the market for the arising credits, they may be encouraged to renew their contract.

I hasten to add that these thoughts are exploratory and any initial trial phase of the UK Peatland Code should be founded on the sort of permanence that early corporate 'sponsors' of peat carbon restoration projects would expect, i.e. based on long-term contracts.





+CO₂

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Trinkwasserwald® e

The association converts privately and publicly owned areas of forest to increase the natural benefits of groundwater recharge in forests. The planting is financed partly by companies wishing to offset their use of water during production activities.



Forests contribute extensively to the production of high-quality groundwater and, through this, drinking water. In Germany, however, the monoculture coniferous forests that cover much of the landscape are susceptible to damage from storms and pests. Groundwater quality and recharge rates are also significantly lower in monoculture coniferous forests than in deciduous broadleaf forests. Studies show that a deciduous forest provides an annual average of 800,000 litres of available groundwater per hectare more than a monoculture coniferous forest. With this in mind, two forest engineers and an industrial engineer founded the non-profit association Trinkwasserwald® e.V. (Drinking Water Forest) in 1995. The stated aim of the association is to convert non-native coniferous forests into mixed deciduous forests by seeding them with deciduous trees. The primary purpose of this forest conversion is not to store carbon dioxide or to increase biodiversity, however, although these are welcome side effects. The main goal is rather to produce more clean drinking water. The slogan of the association is therefore: *Wir pflanzen Trinkwasser! (We plant drinking water!)*

The non-profit environmental association currently has three regular employees and fifteen freelance employers. Up to 2000 voluntary planting helpers support the team during planting sessions. The forest conversion is financed mainly by businesses and private individuals attracted through various

campaigns of the association. Other funding is received to cover accompanying environmental education, for example.

In 2008 the association started the “Ressourcen schaffen – Trinkwasser pflanzen” (Provide resources – plant drinking water) campaign that targeted businesses requiring large quantities of water for their production. Similar to the idea of offsetting greenhouse gas emissions, companies could offset the amount of water they use when creating one or more products through forest conversion. This approach has been adopted by the Bionade GmbH, for example, which manufactures non-alcoholic beverages from biologically controlled raw products. The company has financed the planting of more than 60 ha of new ‘drinking water forests’ in several locations throughout Germany that will generate about 50 million litres of additional groundwater. In this way, Bionade aims to offset their entire annual consumption of water used to produce their drinks. If their water consumption increases, the company will plant additional forests.

Each company assumes the entire cost of planting the drinking water forests. Costs vary depending on the size of the area to be converted and are generally estimated to be € 17,500 to € 20,000 per hectare for the selection of the area, ground preparation, planting material, the planting process itself as well as the long-term care of the area and any necessary replanting required. Trinkwasserwald e.V. is responsible for the implementation of





the measures and pays the landowners for the maintenance of the forested areas.

Once a year, the association together with the landowners and a local forester perform an inventory check of the site to jointly determine whether any replanting is required. To assess the forestry and environmental effects of its projects, Trinkwasserwald® e.V. works in close contact with the Eberswalde University for Sustainable Development and the Department of Resource Management at Göttingen's University of Applied Sciences and Arts. These partners examine the effects of specific forest conversion and determine what drinking water gains are to be expected in certain regions. The groundwater recharge rates are estimated for each replanted area based on scientifically monitored comparison sites.

Other activities of the association have less to do with the PES principle, and are more likely to be seen as traditional financing instruments for nature conservation measures that have been creatively designed and implemented. For example, the "Blätterwälder®... plant together" campaign is based on a close partnership with the regional media that targets the general population. Suitable areas for forest conversion are selected based on ecological, forestry, infrastructural and media aspects. The press regularly reports on the project and calls on the public to sponsor a tree by way of donation and/or personal involvement in the planting process, and thereby contribute to the emergence of the new forested area. Tree sponsorships are available for € 5 per tree. The trees funded through this process are then planted as part of a much promoted and well attended planting festival. Since the campaign started, more than 70,000 trees have been planted.

Further to their forest conversion work, the association is also active in the field of environmental education. Through cooperation with multipliers such as the media and business (for example, a regional transport company runs ads for the "Blätterwälder®... gemeinsam pflanzen" campaign in its trains), large sections of the population can be reached and informed about the services and the link between forests and water. The planting process motivates a large number of participants who can also take advantage of the environmental education on offer. The association and its leaders have been awarded several environmental and volunteering prizes in recent years, including the Ausgewählter Ort (Selected Landmark) title as part of the "Germany – Land of Ideas" initiative.

Trinkwasserwald® e.V.

Region (area):

Germany (currently working on about 2,500 ha)

Starting year (stage):

1995 (ongoing)

Objective:

Improvement of drinking water quality and quantity

Beneficiary:

Businesses and private individuals acting as buyer

Service provider:

Private and state landowners represented by Trinkwasserwald e.V.

(Other) Intermediaries:

Foresters, Eberswalde University for Sustainable Development (HNEE), Faculty of Resource Management at Göttingen's University of Applied Sciences and Arts (HAWK)

Payment arrangement:

input-based, level of payment is based on the production cost

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*Interview with Alexander Pillath,
Managing Director of Trinkwasserwald® e.V.*

“I would strongly recommend to everyone that they make sure their projects are properly balanced and reliably funded before they are actually launched.”



Have you faced any specific challenges in implementing the projects?

An incredible number of organizations had to be convinced, from the agencies and forestry institutions and private forest owners right through to corporate representatives. The important thing is to go there and talk to the people so that they know what's going on. And then just hope that they view the project favorably and endorse it, or in the worst case, at least tolerate it.

In the region around Lüneburg, where we've run a Blätterwald project every year since 2007, we found that the first year was a trial year, while a few more people took part in the second year, but it was still limited, and amazingly, from the third year, I wouldn't say it exploded, but it picked up enormously and has remained that way till today. So it needs a start-up period of two to three years. You need to know that and it shouldn't discourage you.

One particular challenge is just getting a positive action off the ground. Finding a multiplier like a newspaper, for example, that sees something good in your project and then spreads the idea to the wider world. It's nice to know you're doing something good, but if no one knows about it, then no one can participate in it. That was certainly one of the problems, especially since we operate almost exclusively via donations. These days things are changing in terms of people's willingness to donate. Unfortunately, most people initially focus on the shortcomings. But we are shaping things for the future. It's hard to explain that the effects of what we want to achieve will only be noticed after ten or twelve years, but then it will be there as something permanent for future generations. There is a beautiful expression: "If you think in terms of years, plant a seed. If you think in

terms of decades, plant a tree.” So sometimes you need to be proactive and not just react when the shortage is already there. It has not been easy to convince people of that. We’ve increasingly noticed in recent years that even the reputable media tend to sensationalize things to elicit a quick response, so things go in one ear and out the other. So there hasn’t been much coverage of projects like ours.

How does the cooperation work with the media that you use as multipliers?

Usually the papers announce where the next Blätterwald is to be six to eight weeks before the project starts, and inform the public about water and environment-related issues in the region. The coverage draws people’s attention to their region’s environment. And that way obviously we motivate people to make a donation. It goes from the single tree that a grandfather sponsors for his grandson all the way to the businesses that say “We’ll sponsor 1,000 trees, because we’re the ones that use the water here in the region.” It was important for us to involve the population as a whole, young and old, families and companies. We are firmly convinced that dividing or recriminating people won’t help. Instead, we hope to create a meaningful bridge between business and ecology. What we really don’t want is any kind of greenwashing or selling of indulgences.

How do you deal with the topic of greenwashing?

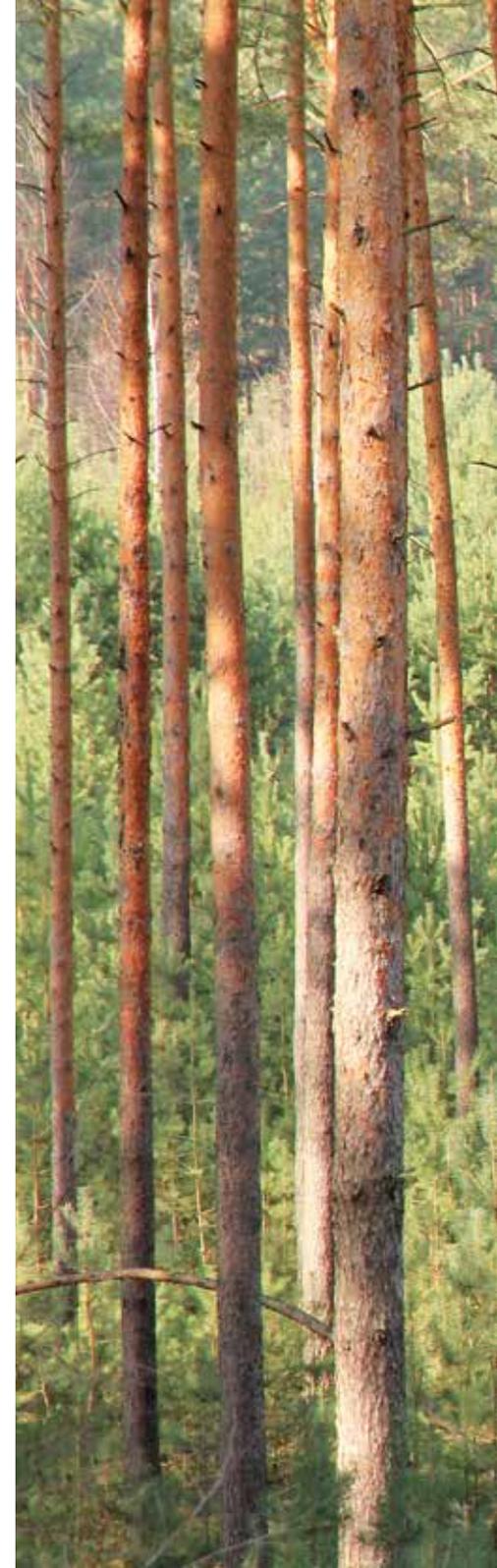
We work intensively with companies that would like to participate in the project. We look into the background of those companies. If it’s just a donation like “We’ll just give some money and get a better image in return” we say: “No thanks. You’re welcome to join in, but we don’t want you presenting

yourself as partners.” But then there are other companies where we notice that they’re on the right path, that they take sustainability seriously and are focused on it and care about it. Such companies are really welcome as partners. Bionade for example. They wanted to offset all the water used in their product. The charm of this project, after all, is the one-off investment. Of course, we also do replanting, to make sure that the trees get a good start. But after that, the forest does the work. You don’t need to replant every year. You just do it once, and then the forest runs like a groundwater factory.

What would you say made the association and its projects a success?

The Trinkwasserwald® association was a simple idea that could be implemented here locally but had a national, perhaps even international, context as well. And secondly, by running it locally, you can see the clearly measurable effects. It is also an issue that touches people, a very emotional issue. And people become more sensitive to it when we talk about the privatization of water rights and fracking, for example. And fourthly, you need highly motivated and passionate people. Bringing something like this about requires a huge amount of time and commitment, especially if it’s done voluntarily.

Basically, it’s important to speak the other person’s language, and start from where they are and not hit them over the head with an ideology, along the lines of “You have to do this and that, it’s your responsibility”. That doesn’t work at all. Instead, it’s important to arouse people’s enthusiasm, but that enthusiasm has to have serious roots. There has to be passion, but it needs to be guided and be allowed to grow.



It's also important that you have an enthusiastic partner on the outside helping out. For example, if you don't have one editor at the newspaper who says "I'll wave the flag once a year, I think it's great and I'll be your public face" you're going to have difficulties. You won't be able to energize the public. The same thing applies to popular public figures. That's why we've been happy to work with serious artists in the past. This has been put on the back burner a bit lately because the media doesn't really go for this out of fear that the artist may have a skeleton in the closet. So we created two characters ourselves a couple of years ago – "Mr. Forest" and "Mrs. Water". These are, so to speak, our artistic multipliers. They go out into the pedestrian zones all costumed up and do a great little act, confronting people with the issue and emotionalizing it as well.

Is there something that you would do differently if you were developing a new project?

We should be better at balancing charitable involvement against economic factors. We've launched a lot of projects where we've advanced or risked considerable amounts of our own money supporting and funding them. And we had no return on investment in the traditional sense. You can only do that a few times. I would strongly recommend to everyone that they make sure their projects are properly balanced and reliably funded before they are actually launched. And to have the courage to postpone or cancel the project if funding is not assured. No matter how enthusiastic or passionate you are, you need to lay down some strict economic guidelines.



"Mr. Woods" and "Mrs. Water" draw public attention to the topic.





Westcountry Anglin

The PES was initiated by the environmental organization Westcountry Rivers Trust and private landowners. Recreational anglers are granted access to private fishing grounds for a fee. Beforehand, the owners invested in the upkeep of the waters and the riparian zones to increase the recreational value for the paying guests. Alongside, the overall ecological condition of the water bodies is being improved. Tokens which can be purchased and redeemed through the environmental organization serve as a means of payment.



South West England is one of nine administrative regions in the United Kingdom and has an area of almost 24,000 km². The counties located here are known as the ‘West Country’, where numerous rivers, streams and lakes flow through a landscape of lush green hills. Fishing has long played an important role here, and even today the waterways are rich with salmonids like grayling, sea- and brown trout. However, these waters are often located on agricultural and forested land owned by private individuals and are poorly maintained. Against this background, the Westcountry Rivers Trust (WRT) environmental organization together with the owners of the fishing grounds developed a fishing pass for the region known as the Westcountry Angling Passport.

The passport includes three different permits to fish for salmon, trout and other cold-water fish: (i) the ‘Booking Office’ allows permit-holders to reserve fishing rights in the 14 currently established fishing zones for a fee; (ii) ‘Dartmoor Fishing’ provides a license for certain zones (totaling more than 90 km) and periods; while (iii) ‘Token

Scheme Fishing’ is a tokening system that grants flexible access to numerous private fishing zones.

From a PES perspective, particularly the Token Scheme is interesting. Its concept is simple: Farmers and owners of farmland, forest and moorland areas located near the banks of rivers, streams or lakes allow recreational anglers easy access to their fishing grounds for a fee. In order to attract paying guests with the best possible angling conditions, the owners invest in the maintenance of the waters and riverbank areas: They cease to use the riparian zones for intensive agriculture; they prune trees and shrubs on the water’s edge to reduce shading of the water surface. They also put up fences and build fishing docks, stairs and pathways. Thus, the recreational value of the landscape is being improved; anglers are able to enjoy nature and their leisure pursuit. At the same time, other ecosystem services are maintained and improved, especially water quality and the habitat of various plant and animal species living in the waters.

What makes the concept unique is its payment system. Since 2003, participating anglers have been able to purchase tokens from nine different outlets or over www.westcountryangling.com for a unit price of £ 2.50. After fishing, they drop the tokens into the boxes provided at the fishing grounds. These tokens can be used throughout the year but expire on December 31. The fishing grounds are rated according to their water quality, type of fish and expected fishing success. The owners themselves specify the number of tokens required to fish their waters – normally between two to five tokens – as well as the maximum



g Passport

number of tokens that can be sold each year. This allows owners to specify the value and demand for their waters. Owners exchange the tokens at the WRT and invest the cash received back into maintaining the fishing grounds.

The WRT advises landowners on all aspects related to the restoration and maintenance of their fishing zones. In addition to collecting information on the number of tokens sold and the number actually used, the organization also uses the tokens to help collate data about the condition of the fishing grounds. The WRT's website provides the latest information about the fishing grounds and their fish populations. Maps are also available online and in a brochure. The WRT organizes and distributes the money that is paid out completely every year. Costs incurred by the organization are covered by advertising on the website and in the brochure. In addition, funds of the European Union were also used to implement the project in 2003, and for the revisions and additions in 2009.

During the initiation phase of the project, the biggest challenge for the organizers was to encourage land owners and farmers to participate in the scheme and to convince them to invest the proceeds from their tokens in the fishing grounds. The farmers were and still are particularly concerned about losing potentially valuable farmland. To mitigate these concerns, the WRT consulted with the farmers and offered them ways to improve efficiency and increase productivity. There was also some criticism concerning the different conditions required for participating in the project, and for achieving revenues. For example, significantly more revenue can be generated from the larger rivers that are more suitable for fishing than from smaller waterways, or that the source areas unsuitable for fishing are nevertheless crucial for the quality of the fishing zones down-

river. The organization is currently working on a solution to these issues. Here, as in all other areas, the long established relationship between the WRT, the landowners and anglers plays an important role.

There are currently 41 accessible fishing zones in the West Country. This figure is expected to rise further in the coming years. The successful concept has met with general approval and is being copied in other regions of the UK. The tokens can also be used in several interconnected regions. The anglers who travel from all over the UK generate revenue for the owners of the fishing grounds as well as the providers of tourist services.

Westcountry Angling Passport

Region (area):

South West England, United Kingdom (about 190 km of fishing zone)

Starting year (stage):

2003, revisions and additions in 2009 (ongoing)

Objective:

Improvement of cultural services, esp. recreational opportunities

Beneficiary:

Recreational anglers from all over the UK

Service provider:

Landowners and farmers represented by the Westcountry Rivers Trust

(Other) Intermediaries:

European Union

Payment arrangement:

Rather output-based; level of payment determined by provider as per amount and worth of sold permits

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Blühendes Steinbur

The Stiftung Naturschutz Schleswig-Holstein and the Local Farmers' Association are testing two innovative mechanisms for PES as part of the pilot project. Farmers are paid output-based for the extensive management of grassland, whereby they must show evidence of indicator species on their fields. The farmers themselves determine the amount of the payment to be received in advance following a tendering process.



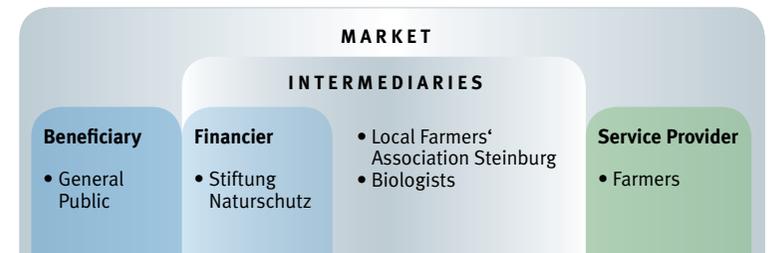
The use of species-rich meadows and pastures that often lie on unfertile and unprofitable farmland has either been intensified or abandoned more and more frequently. Both have led to a loss of biodiversity. The once typical and colorful grassland plants such as marsh marigold, cuckoo flower or meadow buttercup have become less common. This situation helped prompt the State of Schleswig-Holstein's Stiftung Naturschutz (Nature Conservation Foundation of Schleswig-Holstein), established in the 1970s, and the Local Farmers' Association to bring the Blühendes Steinburg (Flowering Steinburg) project to life in 2007.

The aim of the project is to examine two PES approaches, both of which have been proven elsewhere, in terms of their suitability for the conservation of species-rich grasslands, and also to make these approaches more widely known in Schleswig-Holstein. The first is the output-based payment mechanism, the second is the use of tender procedures. The approach of paying farmers based on outputs has already been practiced for a number of years in certain German federal states, such as Baden-Württemberg and Lower Saxony, under the governmental agri-environmental programs. Often, how-

ever, the payments are combined with farming requirements or they work as a smaller financial supplement made on top of input-based payments. The output-based payment approach is not currently part of the standard toolkit used in European, national and country-specific incentive programs. The tendering process is not an entirely new approach to PES either. As yet it has not really been put into practice, however.

The effectiveness and efficiency of both approaches and the response of the local farmers is now to be tested in Schleswig-Holstein. The target areas of the pilot project are dry and wet grassland sites in the district of Steinburg. The district is located between the Lower Elbe and the Kiel Canal, and has a surface area of 1,056 km². One of the defining characteristics of the landscape is the marshlands skirting the Elbe River with a width of 10 to 15 kilometers.

The project rewards farmers if they continue to use species-rich meadows and thereby maintain their biodiversity. Exact guidelines for the management are not set down. What matters is the result, in that farmers are paid if they can show evidence of certain indicator species typical for the region, for example ragged robin, woodrush or bluebell. The farmer sets the amount of payment to be received in advance following a tendering procedure where farmers are asked, either as part of their main business or as a side project, to make fields available for the Blühendes Steinburg project. These areas must belong to the Steinburg district and be used for agriculture every year. They cannot be owned by a foundation or any other public



organization, and cannot be subject to any natural conservation obligations, such as any contractual nature conservation or obligations that are made in connection with the Eingriffs-Ausgleichsregelung (impact mitigation regulation). The farmer can provide details of the field by means of a simple, predefined form. On the form, the farmer can also suggest the price per hectare at which he or she wishes to offer the area. The price can be set at two fee levels: one for the situation that at least four indicator species are found, and the other for the detection of at least six corresponding plant species.

An annually updated leaflet carries information regarding the indicator species, the method of observation and the tendering process. The plants are typical for species-rich grassland sites, usually with a moist or wet consistency, and are easy to recognize. Farmers can therefore clearly gauge the extent to which their fields are eligible. The tendering period runs until mid-April. After the bids have been received and evaluated by the Stiftung Naturschutz, commissioned biologists survey the area offered together with the bidding farmer. The transect method is used, in which three defined sections of the area are systematically analyzed to count the species present. This yearly inspection determines whether the field on offer is eligible or not. Once all the areas have been examined, a bid's acceptance is based on the level of the respective field's eligibility and its proposed price. The lowest bids are considered first, followed by the next highest until the total annual budget has been allocated. There are no contracts, no management requirements and, accordingly, no sanctions.

On average, 20 farmers participate each year with a total of 120 to 150 hectares of grassland. The majority of the land is located in the marshes and on river and stream courses. The

annual budget of € 10,000 and the fees for commissioned biologists come solely from the funds of the foundation, whose staff organize the annual process of tendering, bidding, acceptance and the consequent payouts. The Local Farmers' Association supports the project with its high connectivity in the region, while also promoting it among its members. At the start of every new tender, a press release about the project is issued and published in the regional daily newspaper and farming periodicals.

The Blühendes Steinburg project is one of the few examples of an output-based payment scheme for grassland areas that, for over seven years now, has been successfully implemented in combination with a tendering procedure. It is interesting to note that it was never the aim of the initiators to reach areas with a very high nature conservation potential. Their intent was rather to test and raise awareness of the two underutilized PES approaches to support areas that lacked existing nature conservation requirements.

Numerous publications have attested to the project's worth, praising how the principle of output-based payment in combination with the tendering process has helped to make it a success in Steinburg. The project has been lauded as unbureaucratic, target-oriented and practical. Furthermore, the focus on indicator species as well as the personal contact between biologists and farmers has led to a greater understanding of nature conservation. The project has been widely accepted by farmers and is well received. It has also led to a strengthening in relations between the Local Farmers' Association and the foundation.

To build on the success of the pilot project, the initiators have sought to extend the project area to the whole of

Blühendes Steinburg

Region (area):

The district of Steinburg, Schleswig-Holstein, Germany (120-150 ha subsidized area)

Starting year (stage):

2007 (ongoing, expected termination: 2014)

Objective:

Protection and enhancement of biodiversity

Beneficiary:

General public represented by Stiftung Naturschutz Schleswig-Holstein acting as financier

Service provider:

Farmers

(Other) Intermediaries:

Steinburg Local Farmers' Association, biologists

Budget:

€ 10,000 per year in remuneration fees
+ € 1,500 to € 2,500 for expert reports

Payment arrangement:

Output-based, level of payment is determined individually by the service provider

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Schleswig-Holstein. In a bid to help this process, EU funding was applied for and approved. The EU commission also took up the idea and is currently looking at the possibility of extending the project to all EU Member States. Although the initial preparatory steps have been taken in that direction, a final decision has yet to be made.

The Maiden Pink likes poor, lime deficient soils.



*Interview with Tobias Meier,
Stiftung Naturschutz Schleswig-Holstein,
Employee responsible for the project*

“I believe that the farmer is approached from a different direction with this project. He doesn't feel like a service provider for nature conservation, but instead like a producer of nature conservation.”



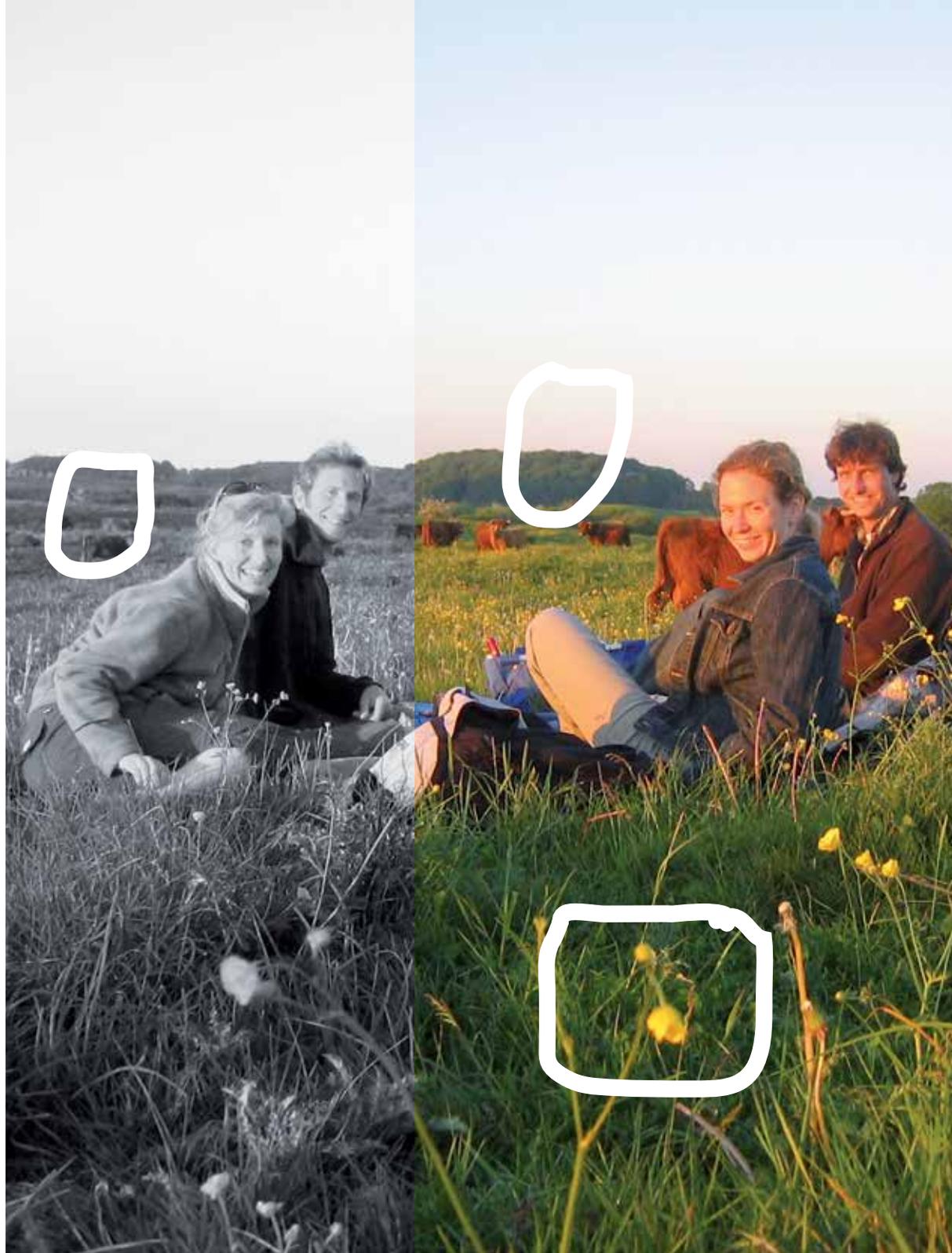
What were some important considerations and steps taken when designing the project?

I first attended an event where the different approaches to output-based payment were presented, and listened carefully to learn what worked well and what didn't work so well. Our idea was not to create something new, but to combine existing approaches so that only a minimum amount of administrative effort was involved, and that farmers didn't have to invest a lot of time to make a bid. We simply wanted to keep the design lean, and we definitely wanted to include the concept of tendering.

We were then uncertain which method we wanted to use – either the concept employed by the University of Göttingen with

the 'continuous circles', or the transect method that was applied in Lower Saxony. We tried both in a preliminary study with four farmers and biologists. Both the biologists and farmers subsequently reported that the transect method was easier and faster. Apart from that, we also needed to find out which plants met the criteria of being an indicator species for Schleswig-Holstein. With the aid of the indicator species list for Lower Saxony, we used the transect method to inspect 100 areas in different parts of the state, and on the basis of that investigation, compiled a list together with the regional agencies.

And then there came the subject of payment, which we made relatively easy for ourselves. Ultimately we only had a limited budget to work with, and we wanted to receive bids from the farmers. So we simply said, "If your field has four species, what kind of price are you looking to receive? If your field has six kinds or more, what price would you be looking at then?" And in this way the bidding form could be filled out relatively quickly. The farmer only has to say which area he wants to offer, and how much money he wants to offer it for. But he doesn't have to indicate that he expects fee level two for area X at 100 euros, or fee level one for area Y at 50 euros. We wanted to have fee levels, and for that we created partial budgets of 6,000 euros for fee level one and 4,000 euros for fee level two in advance. We then waited to see which areas came in at which fee level. We allocated the funds to the cheapest until the budget was used up. It's of course obvious that farmers with areas at fee level two, namely those with six indicator species, wanted more for the surfaces than those with just fee level one areas. If we hadn't set a partial budget, then those with fee level two areas would have always been allocated first.



Is participation in the project financially attractive to participants?

There have been repeated statements by the farmers that it was not about the money, but that they thought it was a good idea, and they had the feeling that, ‘while I won’t get rich doing this, I will in some way bring attention to the fact that I am extensively managing my land – particularly in an area where there is no chance of receiving any other additional funding’. This was more the motivation. No farmer that I talked to assigned production costs for this. They just said this area is worth 50 euros and that one 100 euros. And if I am not successful, and still think the project is exciting, then I’ll try next year with a slightly lower bid. Most areas that were proposed were marginal land anyway, which farmers generally cultivate a bit more extensively, or where they say, for historical reasons, ‘I always picked cuckoo flowers here for Mother’s Day when I was a lad, and that’s how it should be in the future too’. So there are other motives at play than just economic ones.

Do you feel that you will reach the areas with the highest potential using this method?

We never intended to find the areas with the highest potential. One concern during the whole discussion with the farmers was that high-level or valuable areas prime for nature conservation would be identified as a result of the project. If the farmers in the next few years, let’s say for economic reasons, then decide to convert or intensify the area, then a local agency could step in and say, ‘No, you can’t do that’. It was a great concern that they’d then have problems. We had to alleviate these fears. Therefore, we did not prescribe how the areas were to be farmed, and so for us it wasn’t all that important to discover the

areas with the highest potential. It was only important to test the method and to make it more widely known, and then to see if it was a viable addition to the already existing options in contractual nature conservation.

In your opinion, what was it about the project that made it so successful?

Simple design, little effort for farmers, and certainly also that the results are visible. You can go to the area and say ‘it’s in place or it isn’t’. And the farmers are not directly restricted in its management. Indirectly yes, since the plants can only take a certain amount of cultivation. Perhaps it is also the curiosity about being involved in such a project with its output-based payment and tendering process. It’s something completely new for the farmers to decide on how much money they want to receive for it. At first they were unsure, since they were used to doing things differently. But it also made them curious.

It is often said that an individual or organization needs to actively commit to a project for it to be successful. Was that or is that the case with you as well?

I wouldn’t say so. The project itself is relatively extensive; I wouldn’t say that has come about incidentally, but it hasn’t cost us a huge amount of manpower either. Therefore, you can’t say, ‘If the foundation or the Local Farmers’ Association hadn’t stood behind us, then the project wouldn’t have got off the ground’. I think at the beginning we came to a consensus relatively quickly that we wanted to try this project out. And we also had a representative from the Local Farmers’ Association who is well networked in Steinburg and who spread the word here and there. From time to time we also considered whether to offer it nation-

wide or to suggest it to other associations, but we didn't have the financial resources for that. To my mind there is no one who has really spearheaded this project. But once or twice a year we did hold talks with local conservation agency representatives from the Steinburg district, the Chairs of the District Farmers' Association, the State Office, the Ministry and the foundation.

Would you say your experience with the project has been enjoyable or not?

Enjoyable! I believe that the farmer is approached from a different direction with this project. He doesn't feel like a service provider for nature conservation, but instead like a producer of nature conservation. They are not regulated by nature conservation. You can see individuals motivated by this. It's also nice when one of them comes and says, 'I have too little experience in managing such a species-rich area – have you got any ideas? How can I further exploit my field in terms of nature conservation, and what methods are there to do that?' We have actually reached that point. There was even deliberation as to whether one could develop methods to optimize areas with the transference of grass cuttings, field seedings or similar ideas. We sat together with the State Office and discussed how you could build and structure such a development. There were also some farmers who wanted to try out various methods and take part for free, simply because they had fun doing it. But unfortunately that failed due to my limited time capacity. Nevertheless, it's still motivating and a great result to discover that there are farmers who are intensively occupying themselves with biodiversity and nature conservation in principle, and who want to get more out of it. They are approached differently and are not regulated. They can do what they like on their land. Really the only deci-

sive factor is the result. This changes how one views this, and that could, to my mind, be quite beneficial in one or two areas of nature conservation.



Edwards Aquifer Pr

The City of San Antonio obtains its drinking water primarily from an artesian aquifer. In order to protect this source, land owners in sensitive areas refrain permanently from implementing specific forms of land use. In return, they receive attractive payments financed by an increase in the local sales tax. Residents themselves voted to introduce and continue the program.



The Edwards Aquifer is one of the most important water resources in Texas and one of the biggest artesian aquifers in the world. It serves as the primary source of drinking water for nearly two million inhabitants in the City of San Antonio and the surrounding communities. The water from the aquifer supplies regional rivers and lakes that contain a diverse range of fauna and flora, including a number of protected species. The Edwards Aquifer is a karst aquifer consisting of porous lime-stone, and its water catchment area covers a region of approximately 10,000 km². Rainwater can seep through its pores, cracks and crevices into underground caves and rivers. Karst aquifers are unable to efficiently purify themselves, meaning contaminants may spread rapidly, with subsequent difficulties in filtering them out again. The karst groundwater and its aquifer are therefore highly sensitive, especially to the introduction of pollutants. The aquifer is also being threatened by building developments that are in the process of sealing off nearby areas. The quantity and quality of the groundwater are very closely related to the specific area where rainwater collects and eventually seeps into

the aquifer to replenish groundwater levels. The agency responsible for the aquifer, the Edwards Aquifer Authority, must therefore pay close attention to these replenishment areas.

The first regulations to protect the aquifer were introduced in the 1970s in response to the rising water demands of a growing population and industry. However, many of the enacted restrictions affected landowners who did not use the aquifer's groundwater, resulting in some hostile opposition to the government-specified usage restrictions implemented to protect the aquifer. Consequently scientists, conservationists, city residents and landowners jointly developed the Edwards Aquifer Protection Program (also known as the San Antonio Aquifer Protection Initiative).

The idea was to increase the local sales tax by one eighth of a cent to finance the protection of essential sections within the aquifer's catchment zone. In 2000, the population of San Antonio voted in favor of this 1/8-cent sales tax increase.

By the beginning of 2005, this 'green tax' had raised \$ 45 million. The bulk of the money was used to purchase nearly 2,600 hectares of land in the water catchment and replenishment zones. In 2005 and 2010 residents voted to continue the program, with large turnouts on both occasions. The aim was to generate \$ 90 million. Today, the program protects over 45,000 hectares of land in the aquifer's catchment zone.

In the first phase of the program, the land was permanently protected by being purchased directly or being donated. Since 2005, however, the land has been acquired through conserva-



Protection Program

tion easements, which are legally valid agreements whereby landowners, mostly cattle farmers, permanently forgo certain usage rights for the benefit of nature conservation. In most cases this means the areas in question are not subject to intensive agriculture, construction or sealing. Traditional agricultural activities such as grazing, hunting and fishing continue to be permitted in the area along with biking and hiking. The payment is negotiated individually and depends on the original property values and the loss of land value brought about by the restrictions.

The land is monitored and evaluated annually to ensure compliance with the individually agreed management requirements made to protect the groundwater. This monitoring activity is also funded solely from the sales tax surcharge. At the beginning of the second part of the program, launched in 2005, scientists developed geological, biological and hydrological criteria with the aid of GIS modeling to identify the parcels of land most likely to achieve the stated aims of the scheme. The City of San Antonio is responsible for the long-term oversight of the program. The City monitors the individual parcels of land and enforces the stipulations contained in the easements. The non-profit land trusts The Nature Conservancy and Green Spaces Alliance support the city by identifying suitable sites and negotiating with private landowners. Private partners are also involved, including conservation attorneys and real estate brokers, who sometimes advise landowners on their options.

The Edwards Aquifer Protection Program is characterized by the fact that those paying for the ecosystem services are, for the most part, also those that benefit from them. Residents voted to introduce and continue the program and, therefore, more or less voluntarily, to pay for the services themselves.

The city acts as an intermediary. The sales tax surcharge is a stable and comprehensive method of financing. Protecting the land around the sensitive areas of the aquifer – supplemented by additional measures such as consumption savings – is considered much cheaper than diverting water from other, more remote areas and the technical solutions required to clean the water from the resulting contamination. The government and the City of San Antonio play the crucial roles of initiator and organizer, while NGOs and other partners support the process. One positive knock-on effect of the program is the protection of endangered animal and plant species, whose habitat is threatened by a declining water level and the pollution of the Edwards Aquifer.

Edwards Aquifer Protection Program

Region (area):

San Antonio, Bexar County, Texas, USA (in total 79,000 ha; currently about 45,000 ha protected)

Starting year (stage):

2000 (ongoing)

Objective:

Provision of clean drinking water

Beneficiary:

Residents of San Antonio represented by the City of San Antonio through revenues from the local sales tax

Service provider:

Landowners and farmers

(Other) Intermediaries:

Edwards Aquifer Authority, The Nature Conservancy, Green Spaces Alliance, lawyers, estate agents and other private-sector partners

Budget:

2000-2005: \$ 45 million

2005-2010: \$ 90 million

2010-2015: \$ 90 million

Payment arrangement:

Input-based; level of payment is based on land value and opportunity costs for assigned usage rights

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Pumlumon Project

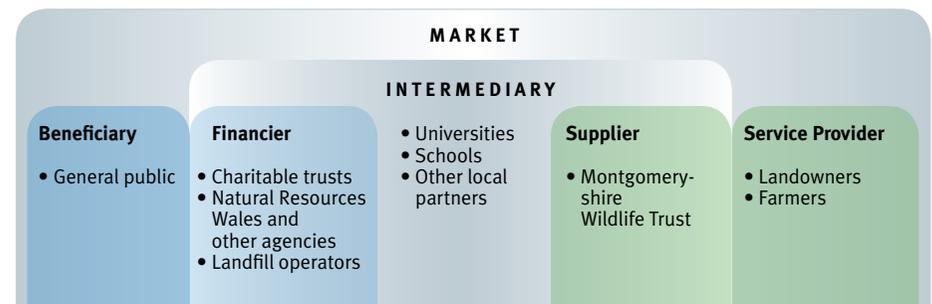
Initiated by the Montgomeryshire Wildlife Trust the PES aims to provide ecosystem services in combination with social and economic benefits. Farmers are encouraged to change their current land management to provide ecosystem services. In order to avoid double funding with government agri-environmental programs, the farmers are paid to maintain the infrastructure that the Trust has implemented.



The Pumlumon is a massif located in central Wales. Like most of the uplands across Wales, ecological conditions in the Pumlumon area have deteriorated after decades of intensive land use activities. Sheep farming, being the main agricultural activity in Wales, has partly contributed to this situation. The results are widespread loss of heather moorland and bog along with dwindling numbers of species, such as red grouse and hen harrier. Bog draining and logging not only resulted in the disappearance of wildlife and supporting habitats, but also in soil quality deterioration and erosion that brought about an increased risk in flash flooding across the area. Uplands drainage dries out the peat soils, causing the release of locked carbon into the atmosphere and the soil erosion affects the water quality. This is a major concern, since the Pumlumon area is the largest watershed in Wales and the source of five rivers supplying water to four million people. At the same time, Wales' sheep farms are struggling with falling incomes, rising fuel prices and declining subsidies from the European Union. As a result, help is needed for both the environment and the farmers.

The Pumlumon Project was developed in order to change the current practices of land management in the Uplands and to create a healthy and species-rich environment. It is part of the conservation program Living Landscape organized by the British Wildlife Trusts (<http://www.wildlifetrusts.org/living-landscape>), which seeks to create sustainable and livable landscapes for people, animals and plants. Hence, the Pumlumon Project is not just a simple conservation project: It is aimed at reconnecting the local population with their environment, and through this, to familiarize people with nature 'on the doorstep' – a process that will thereby create new skills, jobs, and a safer, better future for the local communities.

The Montgomeryshire Wildlife Trust (MWT) is one of six individual Wildlife Trusts in Wales, which formed a close partnership called Wildlife Trusts Wales. On behalf of Wildlife Trusts Wales, MWT started developing the Pumlumon Project in recognition of the fact that farmers can provide more than just food, namely also biodiversity gain and ecosystem services like sustainable soils, water and wildlife management. The organization surveyed all farmers to determine whether they would be interested in taking part in such a new scheme. The team began working with interested landowners by helping them restructure their land management and farm new products. After discussing



the possibilities and agreeing on the areas of land the farmers wished to offer up to the scheme, six pilot projects started focusing on three restoration approaches and management changes respectively:

→ Blocking drainage ditches in the peatland to restore the peat-forming mosses and thereby restore the carbon locking capacity

→ Planting willow, birch and rowan trees to create connecting woodland scrub between upland habitats and lowland woodland and, in the process, improve floodwater management

→ Changing grazing management to low density cattle grazing which should improve habitat quality and therefore biodiversity.

The projects are site specific and therefore require different contracts depending on the individual farm. The contracts consist of two parts: one part focused on the element of changing land management and the second part aimed at ensuring continued management over the entire funding period. Currently this period is no longer than five years, but shall be extended to up to 30 years in the future.

To avoid the problem of double funding in cases where the farmer participates in government agri-environmental programs or may wish to do so in the future, the MWT does not pay the farmer for the activity itself, but for maintaining the infrastructure MWT has implemented on the respective farm. MWT ensures all investment costs and expenses for their implementation. Farmers are paid annually for the provision of the ecosystem service, each with £ 50 per hectare. This value is determined using the Welsh government valuation methods as a guideline. If a farmer decides to block 10 hectares of peat land for rewetting he will gain £ 500 per year for the provision of the land and the maintenance of the infrastructure measures

implemented by MWT. MWT assumes responsibility for the closure of the drainage ditches, but also offers training to farmers to help them obtain these skills. If the farmer also decides to plant one hectare of trees, he will receive an additional £ 50 per year for such an initiative. During the term of the agreement the farm is inspected once a year by project managers. Scientific monitoring of the impacts on hydrology and habitats ensures that any change in the provision of the ecosystem service can be quantified.

The Pumlumon Project is supported by the Countryside Council for Wales, Environment Agency Wales and Forestry Commission Wales which are now jointly known as Natural Resource Wales. The project is financed by a range of charitable trusts and through the Landfill Tax. The tax encompasses a credit scheme where landfill operators can contribute a percentage of their landfill tax liability to environmental bodies to carry out projects in the region. MWT acts as broker and undertakes all monitoring and evaluation within the project area. It has developed partnerships with farmers and landowners, and deals directly with them when negotiating plans, possibilities and contracts. The range of the voluntary arrangements is continually expanding. A key factor in the successful outreach to farmers can be traced back to the employment of a local farmer at the project's beginning. As MWT's Farm Liaison Officer, the farmer was able to help to remove barriers and persuade other farmers in the region.

The biggest challenge of the project was to convince farmers as well as the conservation movement of the viability of ecosystem based business models, demonstrating that ecosystem service delivery was the primary mechanism for protecting biodiversity in the future. In the first five years following

Pumlumon Project

Region (area):

Wales, United Kingdom (about 40,000 ha)

Starting year (stage):

2007 (ongoing)

Objective:

Provision of multiple ecosystem services and biodiversity

Beneficiary:

General public represented by charitable trusts like the Waterloo Foundation, national and regional agencies like Natural Resources Wales, as well as operators of landfill sites (through the Landfill Tax Credit Scheme)

Service provider:

Landowners and farmers represented by the Montgomeryshire Wildlife Trust on behalf of Wildlife Trusts Wales

(Other) Intermediaries:

Local Partners like universities and schools

Budget:

2008-2013: £ 625,000

Payment arrangement:

Input-based; level of payment is based on the payments of government agri-environmental programs and total available budget

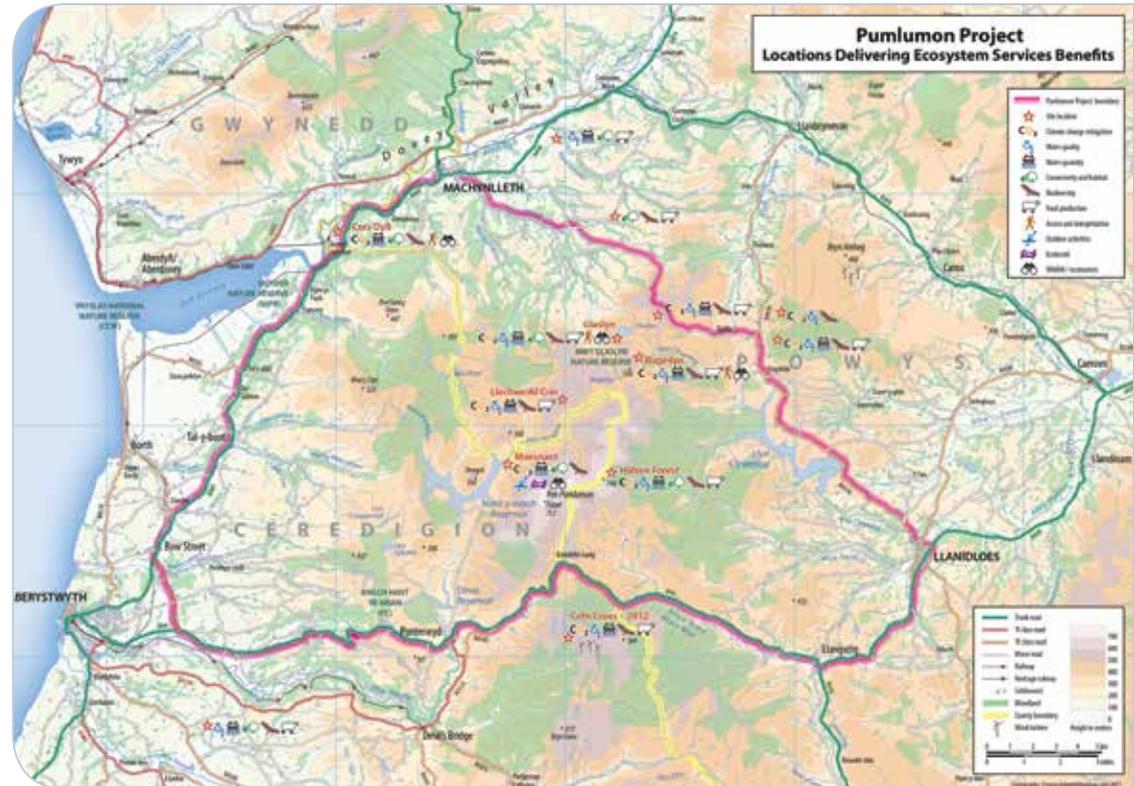
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www.montwt.co.uk/pumlumon.html

Pumlumon Project

its start, the project was successfully piloted with 13 farmers on a total area of 500 hectares of land. The average cost for implementing the measures and paying the farmers has been £ 265 per hectare per year. Hydrological monitoring showed that in one area the ditch blocking had raised the water table by 5 cm. Red grouse levels at this site were the highest recorded in Wales in 2011. Now, companies, organizations and private individuals are invited to help WRT restore the remaining project area over the next ten years.



The area of the Pumlumon Project is about the size of the city of Birmingham. The Sever, Wye and Rheidol rivers have their sources here (pilot projects highlighted in red).

*Interview with Clive Faulkner,
Pumlumon Project Ecologist,
Montgomeryshire Wildlife Trust*

“... getting farmers to recognize that they receive payments for the provision of ES and not necessarily for not having this many cattle or sheep.”

How did you get the project to move forward at the beginning?

Traditionally, agri-environment schemes have looked at that ‘profit forgone’ idea. The way we approached it was about farming new things. We knew we needed to be able to provide the farmers with a financial justification for what we wanted because that was the only rational way forward. It is all about the economic stability of their family business, and they often have a strong connection with their ground and the history of their holding. They want to continue, and they want something for their children to engage in. So looking for a way to make farming in the uplands more economically and ecologically viable was one of our main drivers.

Why is the scheme of importance to farmers?

We recognized that it is the only way to get people to think differently. We recognized the answer is economic. Our core business is biodiversity and wildlife conservation, which actually has failed. We have to adopt this approach and address it

on a much larger scale to stand any chance of getting any possible gain for wildlife. Most NGOs here aren’t doing this because within the Higher Level Schemes in Wales and England, there isn’t that demarcation yet of ES. A lot of it is driven just around wildlife with no recognition of other sources of provisioning services e.g. water and carbon. Producing those new products can actually be more valuable than traditional sources and give more economic stability to farmers as the vagaries of the traditional markets often vary farmers’ incomes from year to year. It makes economic sense for farmers to value these products, change their land management and see their land from a more multifunctional perspective if farmers are paid properly for them. This partly increases acceptance of the scheme.

Do you think there is a general acceptance in the area or an understanding of this sort of approach?

Partly! We own land up in that area anyway. So we had quite a large presence which did actually help. We got in touch with the local landowners to see if there was any appetite, basically, for looking at these sorts of bigger scale projects. And we found that there was. We did actually target a few key people up there, some more friendly ones, who already had the link with us. That really worked actually, and it sort of built up a snowball effect, really. You know when people see their neighbor is getting in to doing something, they think: Okay, you know they are getting paid for that as well. So we want that, too.

Is there anything you would like to change?

The way agri-environment subsidy payment takes place, as this would make our job much easier. That is obviously an EU issue, but that is the main thing. Get rid of the profit forgone

idea and properly valuing these ES and getting farmers to recognize that they receive payments for the provision of ES and not necessarily for not having this many cattle or sheep. It is our perspective on the future of CAP that farmers are paid directly via the entitlement system for the delivery of ES. If the EU starts telling the private industry to find their solutions through ES production instead of engineered solutions, if the EU would force the private sector to recognize the financial viability of what we are doing, that would make it easier. And for subsidy payments to be a formalized channeling of money back to organizations like ourselves or farmers directly, or whomever, to do this work. Not just agri-environment payments. The mind-shift from it being a wildlife trust-funded project or government agri-environment scheme to actually becoming part of the economic system is really necessary.

Who should be responsible for paying for the new products, the ecosystem services?

Obviously, us paying the farmers is not the ideal solution, because that in itself is not sustainable. We are relying on grant funding. And that grant funding isn't necessarily targeted towards ecosystem service payments. That's why we would like to involve the private sector like water companies or floodwater insurance companies. That might take time. Making the connection between people is hard enough but actually business is going to be even harder in some respects. The best we can do is to provide evidence and do scientifically validated monitoring of the services. This is an emerging industry. But to have someone paying for goods and services, you have to have hard data to prove that what you have done actually had an impact on a good or a service.

Could you please value the success of the project on an ecological and social basis?

We have restored hundreds of hectares of wetland habitat over the last few years. Before this project, we were restoring one or two hectares in a similar period. We have improved the quality of the habitat and actually increased species such as red grouse. I think we have made quite a difference in that respect. The societal question is a different one. We have an issue here with the small population within quite a large county: We have got 40,000 hectares but there are only 200 or so people who live in there. So we can be impacting a significant proportion of those people because we are changing the attitudes of those we have worked with and still have a very small footprint in terms of the societal impact. That is one of our next steps. It is funny that we make more of an ecological impact than a societal impact, considering the genesis of the project was about a societal sustainability. But we had to have the ecological delivery first, because now we can say: Look, this is how it works, this is what it is for, this is what happens and this is not scary, this is deliverable. Now we have got a story to go to tell people, and that is a difference.

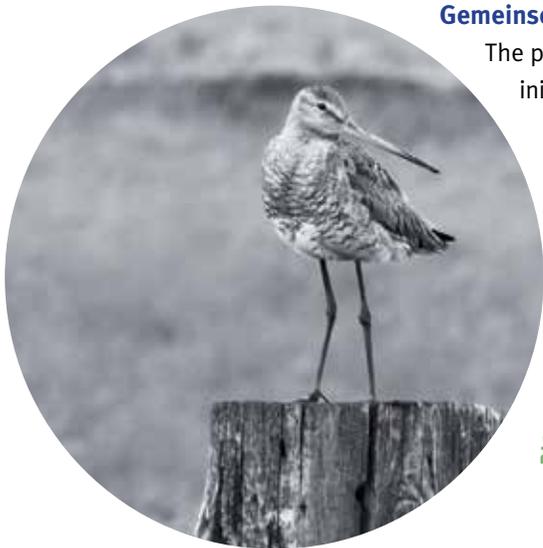


Voluntary government

The following are examples of government-funded PES. The sources of financing are governmental agri-environmental or conservation programs. These programs emerged in connection with the major subsidy programs in the field of agriculture.

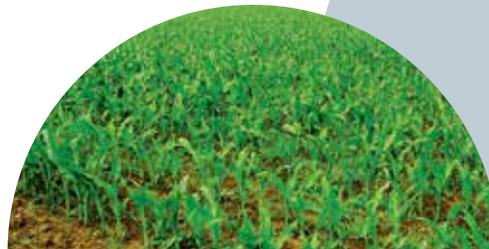
Gemeinschaftlicher Wiesenvogelschutz, Germany

The program for the protection of meadow birds was initiated by a regional environmental association and subsequently taken over by the federal State of Schleswig-Holstein. Farmers are paid output-based for adapting their management of the land so that it does not harm meadow birds and their young. Voluntary site supervisors play a pivotal role by cooperating closely with the farmers.



Niedersächsisches Kooperationsmodell Trinkwasserschutz, Germany

Within the framework of the program initiated by the State of Lower Saxony, water utility companies and farmers are forming autonomous cooperations to safeguard and improve the quality of groundwater. As equal partners, they agree appropriate objectives and measures to be carried out by the farmers in areas where drinking water is protected. Water utility companies fund the measures via their contributions to the water extraction levy scheme.



Florida Ranchlands Environmental Services Project (FRESP), United States

The pilot project was launched by the World Wildlife Fund, Resources For the Future and local ranchers. Supported by federal and state funding, a PES for effective water management on agricultural land was developed and tested. Building on the successful implementation in demonstration ranches, a state agency PES program was introduced in 2011 to promote output-based payments and regulate the selection of participating ranchers through a solicitation process.



tal payments



Performance-based Environmental Policies for Agriculture Initiative (PEPA), United States

PEPA was initiated by the environmental organization Winrock International in collaboration with several universities. Its aim is to improve the cost-effectiveness of agri-environmental programs. To this end, the initiative is developing and implementing different output-based payments approaches that motivate participating farmers to link farm management decisions more closely to environmental outcomes.

Conservation Reserve Enhancement Program (CREP) in Vermont, United States

The aim of this government PES is to reduce the amount of phosphorus entering several water bodies in the State of Vermont, including the important Lake Champlain. Farmers who cease production on environmentally sensitive agricultural lands and who implement special protection and maintenance practices receive attractive payments. In addition to federal, state and local authorities, environmental organizations are responsible for the acquisition and advisory support of farmers.



Naturschutzgerechte Bewirtschaftung von Grünland in der nordrhein-westfälischen Eifel, Germany

Since the mid-1980s, farmers in the Eifel region of North Rhine-Westphalia have been paid to maintain and extensively cultivate environmentally valuable land. The first German project for contractual nature conservation was initiated by a committed university professor. It has now been in operation for 30 years, and is today a governmental program coordinated by the biological stations in cooperation with the district landscape agencies.



In the following examples we are dealing with government-funded PES. The sources of funding are governmental agri-environmental or nature conservation programs like contractual nature conservation. Programs with this approach have been around for a long time. They emerged in connection with the major subsidy programs in the field of agriculture. In recent years, part of the subsidies has been increasingly targeted towards the payments we are discussing these days in relation to PES. Only part of our successful examples, however, are successful nationwide PES. Often it is regional PES that use these programs. In the case of governmental payments, the money for service transfer is voluntary for both parties. So in this regard at least they correspond to the typical principle of a PES. Government, however, acts as financier, standing in, as it were, for society's demand.

The two German examples, *Naturschutzgerechte Bewirtschaftung von Grünland in der nordrhein-westfälischen Eifel* and *Gemeinschaftlicher Wiesenvogelschutz*, are dedicated to the conservation of biodiversity and started many years ago as small, partly privately funded projects. After a promising start on a small scale, the government took over the funding and expanded it. In the course of time, they have evolved into trend-setting governmental PES. The American example *Florida Ranchlands Environmental Services Project*, or *FRESP* for short, is a pilot project, and a government-run program was introduced based on its findings. And the *Performance-based Environmental Policies for Agriculture Initiative*, *PEPA* for short, from the United States was explicitly started with the aim of improving the national agri-environmental programs by testing new approaches. Both American examples are dedicated to ecosystem services related to water quality and have attracted a few

non-governmental financiers in addition to the governmental financiers. In our classification quadrant, therefore, there is not much distance between them and voluntary non-governmental payments. Much the same thing applies to the *Niedersächsisches Kooperationsmodell Trinkwasserschutz*: Measures to protect the quality of drinking water are supported in the framework of the statewide program, funded in large part from the water withdrawal fee paid by the water utilities. The regional companies are obliged by law to make such payments, however, and the revenues are not invested exclusively in the PES. Therefore this approach – in contrast to the Edwards Aquifer Protection Program – is more similar to a tax-funded governmental agri-environmental program than to examples of the voluntary non-governmental payments type. The example also shows that government has the authority to oblige the beneficiaries of the ecosystem service by means of levies to pay for its use – and does not charge those responsible for externalities as in our examples of the mandatory polluter-funded payments type. And finally we describe the American *Conservation Reserve Enhancement Program* example, *CREP* for short, in *Vermont*, which also has improving the quality of the water as its objective. Due to its clear financial structure, it explicitly fits into the category of voluntary governmental payments.



Naturschutzgerechte

Since the mid-1980s, farmers in the Eifel region of North Rhine-Westphalia have been paid to maintain and extensively cultivate environmentally valuable land. The first German project for contractual nature conservation was initiated by a committed university professor. It has now been in operation for 30 years, and is today a governmental program coordinated by the biological stations in cooperation with the district landscape agencies.



Over the centuries the widespread use of traditional, extensive forms of agriculture in Germany led to a wide biological diversity across the country's open fields and grasslands. With increasing mechanization and changing land usage in the 1960s, the meadows and pastures that were once flower- and species-rich became increasingly replaced by highly productive but species-poor types of grass. Other grasslands were left fallow, converted into cropland or reforested. Flower-rich grassland is not just aesthetically pleasing and an important part of the cultural landscape, however. Above all it plays a key role in conserving central Europe's biodiversity. Around 30 percent of the ferns and flowering plants native to Germany grow on meadows, pastures, alkaline grasslands and heaths. Many animal species, especially birds, small mammals and insects are also reliant on these types of land. Today, the biodiversity of grassland is considered endangered in many places.

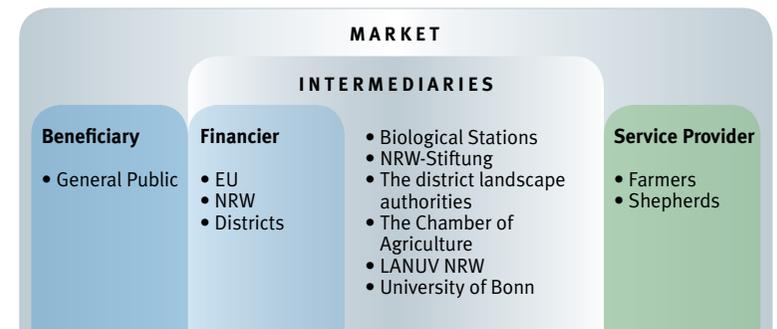
In the district of Euskirchen in the Eifel region of North Rhine-Westphalia, geobotanist Professor Wolfgang Schumacher recognized in the mid-1970s that biological and flower diversity can only be maintained on cultural landscapes through exten-

Naturschutzgerechte Bewirtschaftung von Grünland in der nordrhein-westfälischen Eifel

sive management by farmers. He initially attempted to combine agricultural use with biodiversity conservation on small areas of 10, 20 or sometimes 50 hectares of land. The regional government of North Rhine-Westphalia financed a pilot project from 1985 to 1987 during which time the concept was transferred to larger plots of land. Schumacher and his colleagues from the Landesanstalt für Ökologie and the Chamber of Agriculture wanted, in particular, to explore whether and to what extent farmers can maintain the habitat of ecologically valuable and protected areas, and what costs arise in doing so.

A total of 40 farmers on 200 hectares of land consented to take part in this first nationwide project for contractual nature conservation. This figure was to double in the following two years. Participants committed themselves to manage fields, pastureland, alkaline grassland and heathland according to conservation criteria and to maintaining and/or restoring species diversity. In return for this work, they received a fee. **The specific challenge was to define the necessary work and requirements in such a way that it would be a success from the nature conservation point of view. At the same time, the work was also to be financially rewarding for the farmers. In addition, it was important to the initiators that the general public be made aware of the concept and its success through good publicity.**

While this pilot project was being implemented, a region-wide contractual nature conservation program was created



Grünlandbewirtschaftung

in North Rhine-Westphalia to protect the meadows and pastures in the lowland and upland areas. In 1988, this generated favorable conditions for the expansion of the pilot project to a program for the entire Eifel region of North Rhine-Westphalia. That program is now called Programm zur naturschutzgerechten Bewirtschaftung von Grünland (program for the conservation-oriented management of grassland) and is financed by the European Union, the federal State of North Rhine-Westphalia, and the participating districts.

Major agricultural and ancillary businesses (most dairy farms and nomadic shepherds) cultivate the land according to the requirements of nature conservation. Depending on the type of habitat, for example, participants no longer use fertilizers and plant protection products and have agreed to late mowings or to keeping a smaller number of grazing cattle. In return, they receive € 260 to € 390 per hectare per annum. The money is financial compensation for income losses resulting from the altered form of management. The exact amount depends on the maintenance measures implemented. The premium is paid out at the end of the cultivation year. The dairy farms can also use the hay of the conservation areas instead of straw for young animals and dry cows, or as structured feed in the daily rations of dairy cattle.

Participation in the program is voluntary for farmers. The corresponding contracts have a term of five years and are regularly renewed. Land under nature conservation, FFH areas and legally protected habitats are given preference. Many of these areas are owned by regional, local and municipal governments, foundations and churches. Around 600 hectares are owned by the North-Rhine Westphalia foundation set up in 1986 by the regional government for the purpose of nature conservation

and homeland and cultural maintenance. It leases its land on favorable terms to the farmers (usually for € 50 per hectare per annum) under the condition that these areas are managed according to the nature conservation program and optimized. If the requirements of contractual nature conservation are breached (which rarely occurs), the contracts can be dissolved and/or the lease is not extended. In some cases, farmers also include their own land in the program. But this land is often difficult to cultivate and often contains steep slopes or areas that are moist, low-lying or protected.

The biological stations, founded in the 1990s as nonprofit associations, are responsible for acquiring the land. The staff of the biological stations, partly volunteers, acts as both advisers and the point of contact for the farmers. They also monitor the areas and give the farmers feedback on the success of their maintenance measures. The scientific monitoring, control and evaluation of the program was initially conducted by Wolfgang Schumacher and the Agricultural Faculty of the University of Bonn. Since 1993, however, this task has been carried out by the biological stations as well.

Today, the district of Euskirchen alone has nearly 400 farms on approximately 3,500 hectares of land under the contractual nature conservation program, with some farms having been involved for nearly three decades. The annual volume of grants totals € 1.5 million for the three districts mentioned above. The individual farmer can receive up to € 600 or € 700 per hectare in the highlands and mountainous areas of the Eifel region through land payments and contractual conservation payments, which is financially attractive for many farmers.

The program's nature conservation and ecological success is undisputed: The populations of many rare plant species on

Naturschutzgerechte Bewirtschaftung von Grünland in der nordrhein-westfälischen Eifel

Die Region (area):

The districts of Euskirchen, Düren and Aachen in the Eifel region of Germany (currently approximately 5,000 ha of promoted land)

Starting year (stage):

1988 (ongoing)

Objective:

Protection and enhancement of biodiversity

Beneficiary:

General public represented by the European Union (EU), the State of North Rhine-Westphalia (NRW) and the districts mentioned above in the context of a special contractual nature conservation program as part of the Kulturlandschaftsprogramm of North Rhine-Westphalia

Service provider:

Farmers, shepherds

(Other) Intermediaries:

Biological Stations in Euskirchen, Düren and Aachen in cooperation with the Nordrhein-Westfalen-Stiftung Naturschutz, Heimat- und Kultpflege (NRW-Stiftung), the district landscape agencies, the Chamber of Agriculture, the Landesamt für Natur- Umwelt- und Verbraucherschutz (LANUV NRW) and the Agricultural Faculty of the University of Bonn

Budget:

Currently about € 1.5 million per year

Payment arrangement:

Input-based, level of payment is based on opportunity and production costs, plus in many cases a reduced lease payment for the area

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Naturschutzgerechte Bewirtschaftung von Grünland in der nordrhein-westfälischen Eifel

the extensively cultivated meadows, pastures, and alkaline grasslands have increased significantly. Arnica, antennaria, gentian, cowslip, wild narcissus and many orchids are growing in large numbers again throughout the region. Overall, the biodiversity of the areas has increased significantly. Today, contractual nature conservation is an important tool for retaining the biological diversity of cultural landscapes, not only in the Eifel region of North Rhine-Westphalia but also in other regions of North Rhine-Westphalia and various German states.

*Interview with
Professor Wolfgang Schumacher,
Initiator of the program*

“Farmers must have the feeling the project planners and stakeholders are interested in us, but also know that we must run our businesses economically and that we cannot do everything we would like from a conservation perspective, perhaps.”



Dandelions bloom on semi-intensive pastureland – an important pasture for bees in the spring.



You have been involved in and promoted contractual nature conservation in the Eifel region of North Rhine-Westphalia from the outset. Could you briefly describe specifically what your tasks were in the pilot project?

At the beginning, together with the Chamber of Agriculture of North Rhine-Westphalia, the Rhineland Agricultural Association and the Landesanstalt für Ökologie, I selected around 40 farmers who were ready and able to extensively cultivate ecologically valuable areas. More farmers then registered their interest in the following years. The farmers were firstly briefed onsite about the areas and the work involved. Then, as part of the pilot project, a feasibility study was conducted, many measures were recorded photographically and the first results documented with the help of employees and assistants. My task was to motivate farmers and to check whether and to what extent the measures had been implemented in line with nature conservation guidelines, or if they had to be modified or diversified. Since I knew a lot of the participating farmers from previous projects, there was a good basis of trust from the outset. The aim was to implement high-level nature conservation measures, as well as to get to understand the farmers and their businesses as partners. At the same time, these were favorable conditions for winning over new farmers for the project.

What were or are the typical conflicts you had to consider in designing and launching the program?

There have not been any real conflicts, as such, perhaps because in this region the relationship between nature conservation and agriculture has always been significantly better than in other districts. On the contrary: the project has improved the image of agriculture. Of course, there aren't many alternative

uses in highland and mountainous regions, and therefore conflicts, such as in corn-growing regions or the Börde landscapes, are not particularly significant. Since the land is either under protection and/or owned by the government, there is no competition for land use from biogas plants. This is very important because it would be very bad for nature and the environment if, after decades of highly efficient conservation, it were all to end overnight. To my knowledge, that hasn't happened on any significant area of land in the region. We have the favorable situation that many of the larger dairy farms in the Eifel have been involved in the contractual nature conservation program for a long time and they are the ones that urgently need the predominantly public spaces. Today, of course, it is difficult to get new land because the competition, especially from biogas plants, is very strong.

The crucial question is the same today as it was back then: Can a successful dairy farm sensibly utilize the hay from contractual nature conservation areas? We have long known that this is possible with young animals or dry cows. High-yield animals certainly need sufficient structured material in their feed. Straw is normally used for this, and it might have to be purchased. But hay from the contractual nature conservation program is always better than straw and is successfully used by companies with milk production volumes of between 9,000 and 10,500 liters per cow per year.

Assuming you were thinking of developing a new program, what would you do differently?

I think I would do it the same way, in principle. Certainly, the inclusion of other stakeholders could be done earlier and more efficiently. At the time, I thought it was enough to first



A sea of fragrant cowslips on mown grassland.

Naturschutzgerechte Bewirtschaftung von Grünland in der nordrhein-westfälischen Eifel

approach the individual farmers. But at the same time the agricultural associations, the environmental organizations and the local communities should also be involved.

What, in your opinion, has led to the success of the project?

There are perhaps three important aspects. First, the personal approach: Farmers must have the feeling the project planners and stakeholders are interested in us, but also know that we must run our businesses economically and that we cannot do everything we would like from a conservation perspective, perhaps. By the way, I have always taught my students that you must try to put yourselves in the mindset of the farmers and understand their operational challenges, rather than acting frivolously and preaching to them as some conservationists do.

Second: It is very important to also take into account the economic as well as the ecological aspect. It must be financially attractive for farmers to participate in the contractual nature conservation program. At the same time, it must fit in with the operational structure.

Third: It must be coupled with public appreciation. Farmers should know that their work in conserving biological diversity is important to society. This means the corresponding PR work must also be done. The resulting positive image is quite important for many farmers nowadays.



Many species grow on yellow oat grasslands unfertilized for many years, such as wood cranesbill, lady's mantle and common buttercup.



Gemeinschaftlicher

The program for the protection of meadow birds was initiated by a regional environmental association and subsequently taken over by the federal State of Schleswig-Holstein. Farmers are paid output-based for adapting their management of the land so that it does not harm meadow birds and their young. Voluntary site supervisors play a pivotal role by cooperating closely with the farmers.



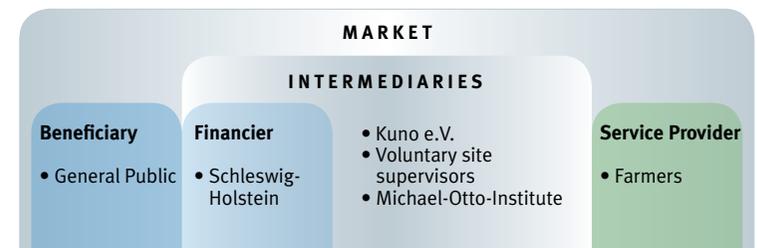
The Eider-Treene-Sorge river landscape is a largely interconnected wet lowland area in northern Germany, a large part of which is designated as a Special Protected Area under Natura 2000. Due to the wet ground conditions, there is barely any cropland but a very high proportion of pastureland. Local farms – for the most part, small and medium-sized family businesses – are mainly dairy.

In the 1990s, a stable colony of meadow breeding birds, a highly endangered bird guild typical to the region, established itself on private pastureland. To protect them, in 1997, the Meggerdorf environmental organization, led by local farmer Dagmar Bennewitz, initiated a collaborative partnership with the farmers. The aim was for the land to be farmed in such a way as to enable the birds to breed and to avoid harming their clutches and young. The additional work incurred by the participating farmers (initially two) was compensated through donations from local companies and banks.

Two years after the successful launch of the Gemeinschaftlicher Wiesenvogelschutz (Community Protection of Meadow Birds) project, the federal State of Schleswig-Holstein decided to take over the financing of the project as a special version of

contractual nature conservation. Since 2007, the output-based regional program has been coordinated by the Kulturlandschaft nachhaltig organisieren (cultural landscape sustainably organized) association, Kuno e.V. for short. The association is a Lokale Aktion – similar to a Landschaftspflegeverband (Landscape Care Association) – responsible for, inter alia, the management planning in the Special Protection Area. The federal state and the EU jointly fund two-thirds of the cost for the association's full-time manager. The manager is responsible for the organization and coordination of the Gemeinschaftlicher Wiesenvogelschutz program, under which all activities are brought together, funding proposals are written, and requests and questions are addressed.

The project also depends significantly on the support of various voluntary site supervisors who play a pivotal role: they look out for meadow birds' clutches and approach farmers about the possibility of them participating in the program. Cooperating with the farmers, they develop management restrictions and monitor compliance. The role of the site supervisors requires substantial skills: they have to identify birds, find their clutches, have a good understanding of agricultural processes and excellent communication skills. Consequently, finding volunteers who fulfill these criteria and are willing to work pro bono presents a significant challenge. The association approaches former farmers and foresters from the respective areas. If they agree to participate, they get trained by Kuno e.V. and receive a small sum to cover expenses.



Wiesenvogelschutz

Effectively all farmers with pastureland where meadow birds are found, both inside and outside the Special Protection Area, can participate in the Gemeinschaftlicher Wiesenvogelschutz project. Clutches are marked so that they are avoided during rolling, hauling, or mowing. All agreements regarding participation and management restrictions are verbal and reached during face-to-face discussions with the farmers. Measures include avoiding clutches during spring cultivation, fencing off clutches on meadows and delaying mowing for part or whole parcels of land. The payment is determined according to the number of intact clutches per hectare of land that is part of the project. The farmer is then informed of this sum and it is recorded on an information sheet. Farmers receive € 150 for individual clutches or € 350 for two or more clutches per hectare. If mowing restrictions are necessary, individual clutches will also receive a € 350 per hectare payment as the amount of work and the economic losses are greater than with other constraints. Should a clutch be destroyed due to force majeure – e.g., if foxes or other predators destroy the clutches before the eggs hatch – payment will still be made.

Kuno e.V. has also taken on the responsibility of making funding applications to the federal state and distributing those funds to the farmers. This is done annually based on the previous year's figures. The farmers also decide on an annual basis whether they want to participate in the program and make no longer-term commitment. Using a parallel scientific study carried out by the Michael-Otto-Institute at NABU (the German Nature and Biodiversity Conservation Union, <http://bergenhusen.nabu.de/institut/>), the efficiency of this wildlife conservation program is constantly monitored based on breeding success.

Today the project is well established in the region and, according to Kuno e.V., is viewed very positively by the general public. Despite some prevailing reluctance to be contacted, the vast majority of farmers approached do go on to participate in the project. Each year, one or two new areas are added. In 2013, 88 farmers participated in the project, protecting a total of 417 meadow bird clutches by limiting the cultivation of the affected land (a total of 310 hectare). There have been no intentional breaches of contract to date. However, the rising competition with corn cultivation for biogas plants and the corresponding increase in land purchase and lease prices is placing pastureland under pressure.

As well as the transparent and output-based payment for the implementation of individually agreed measures, and the short-term, flexible involvement of the farmers, the fact that this project is strongly rooted in the region is noteworthy. Due to the commitment of local voluntary site supervisors and the personal and direct contact with potential participants, farmers have developed a close connection to the project. By participating in Gemeinschaftlicher Wiesenvogelschutz, farmers have overcome their reluctance to be involved in nature conservation generally and, in some cases, this has led to a willingness to enter into action-oriented contractual nature conservation.

Recently, the program has also spread to other regions of Schleswig-Holstein in which species of meadow birds are found: Currently, it is being implemented on Föhr, on Pellworm, and in the Haaler Au, Oberalster, and Miele lowland areas. Civil society organizations are involved in the project in these locations as well, and the Michael-Otto-Institute at NABU coordinates the process.

Gemeinschaftlicher Wiesenvogelschutz

Region (area):

Eider-Treene-Sorge wetlands, Schleswig-Holstein, Germany (approx. 7,000 ha managed area)

Starting year (stage):

2007; pilot 1997-2007 (ongoing)

Objective:

Protection and enhancement of biodiversity

Beneficiary:

General public represented by the federal State of Schleswig-Holstein acting as financier with a special version of contractual nature conservation

Service provider:

Farmers

(Other) Intermediaries:

Local association "Kulturlandschaft nachhaltig organisieren", Kuno e.V. for short (Sustainable Organization of Cultivated Landscapes), voluntary site supervisors, Michael-Otto-Institute at NABU

Budget:

Currently approx. € 90,000 in remuneration fees (recalculated annually)

Payment arrangement:

Output-based, level of payment is based on opportunity and production costs

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Interview with Martina Bode, Managing Director, KUNO e.V.

“It is essential to make nature conservation attractive to farmers, which means that restrictions must be realistic and payment adequate.”

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The eggs of the lapwing were long considered a delicacy. Today, their collection is prohibited throughout the EU.



What are the specific challenges and problems you face in implementing this project?

One challenge is identifying voluntary site supervisors. It is impossible for KUNO to cover the entire territory, particularly as new areas are continuously being added. For this reason, in every part of the project area—between 200 and 600 ha—we have voluntary site supervisors on the ground. The entire project depends on them. Ideally, these supervisors originate from the area and already have a network of farming contacts. They also have to be available for a substantial period of time during the breeding season from mid-March to mid-June and have a certain degree of knowledge about meadow birds.

People with both the required skills and sufficient spare time to invest in such a project are few and far between. We approach former farmers and foresters and provide them with training. This means that, during the first season, we act as a point of contact for the newly trained volunteers and we accompany them on their inspections of the area. Supervisors' expenses are reimbursed.

Another difficulty is the shortage of land caused by the expansion of corn cultivation for biogas production and the pressure this puts on grassland. This, in turn, leads to an increase in land lease prices that pastureland farmers are often unable to afford, leaving them with less land at their disposal. The pressure to farm the remaining pastureland more intensively is on the increase as a result of this competition for land. Consequently, it is becoming increasingly difficult for farmers to accept mowing restrictions, particularly for the first cut, as this provides especially high-energy fodder for dairy

cattle. Nowadays, the compensation for mowing restrictions is not always sufficient to fully recompense the farmer's losses and additional work. However, the federal state government is currently not in a position to increase the payment. As a result, when it involves mowing restrictions, the program no longer seems as attractive to farmers, and for them to participate requires a large measure of good will and enthusiasm.

It is essential to make nature conservation attractive to farmers, which means that restrictions must be realistic and payment adequate. The farming community currently finds itself facing highly unfavorable conditions, land lease prices are skyrocketing, milk prices are fluctuating, and many farms are forced to close as they are no longer competitive. Therefore, KUNO is attempting to develop nature conservation into an additional financial mainstay for farmers. Programs range from *Gemeinschaftlicher Wiesenvogelschutz* which, depending on the farm and the area, can be more or less profitable, via contractual nature conservation focused on individual tracts of land all the way up to the newly developed contractual conservation management prototype we are currently piloting, designed to attract farmers. This project targets the entire farm, i.e., it involves all of the farm's permanent pastureland, which means much more substantial income secured for at least five years. In this way, perhaps some farmers who start with *Gemeinschaftlicher Wiesenvogelschutz* may ultimately discover that nature conservation can be an alternative to this 'get big or get out'.

When and where does conflict with participants arise?

Conflicts arise when verbal agreements with the farmers are not properly conducted or misunderstandings occur. To prevent

this from happening, each site supervisor discusses remuneration with the farmer again prior to payment. In addition, each farmer receives a written document recording the tracts of land that are part of the project, the meadow bird territories and bird species found, the type of management restrictions, and the payment due to be received for this.

What has made this project so successful?

The key factor is personal contact with the farmer. We do not communicate by telephone but rather meet with the farmer in person, outside in the field, and discuss possible management restrictions with him face-to-face. The fact that the site supervisors are frequently from the region themselves and have hands-on experience of the farming profession has a positive impact on the situation. These are people, some of whom the farmers have known for years, with whom there is no reluctance to make contact. This makes cooperation a lot easier. Centralized coordination from a great distance, for instance from the federal state capital, would be much more anonymous and therefore less effective. The program's high degree of flexibility is also viewed very positively. Farmers do not have to contractually commit themselves to participating for a number of years but rather just for the current season and the specific area of land that is populated. This way they can carefully test the waters when it comes to nature conservation.

Another factor revolves around the specific circumstances of farmers in this region: they have always had to work within tight parameters resulting from the natural environment, since their farms are located in a wet lowland area with difficult farming conditions. Even before the *Gemeinschaftlicher Wiesenvogelschutz* project, a number of farmers already showed considera-



Up to 4,000 dwarf swans spend February and March in the lowlands. This amounts to a quarter of the global population.

tion for clutches and chicks. Furthermore, many of these farms are small and medium-sized family businesses, the structure and modus operandi of which make it much easier to introduce management restrictions there than on a larger farm. Along with a small number of larger farms, it is these family businesses that we have approached with regard to the Gemeinschaftlicher Wiesenvogelschutz and it is these same farms that have ensured the project's success.

Do you associate the project with especially pleasant or unpleasant experiences?

The most unpleasant experience is when agreements that have already been concluded with farmers become obsolete due to the loss of clutches at the hands of predators. A lot of time and energy is invested in finding clutches and negotiating agreements with farmers and then, before the eggs can hatch, some clutches are cleared out by foxes or other predators. This is extremely frustrating. Fortunately, thanks to conservation measures, there are always enough clutches left that do hatch and contribute to successful breeding among the meadow birds. This gives us, the other site supervisors, and the participating farmers an incredible sense of achievement that is only made possible through partnership and cooperation. We are particularly rewarded when, as a result of agreements with farmers, we are able to observe meadow bird species in the area and thus witness tangible evidence of the success of our work.



Lapwings breed on open, flat, wet grassland, often in company with godwits and other meadow birds.



= €

FRESH

The pilot project was launched by the World Wildlife Fund, Resources For the Future and local ranchers. Supported by federal and state funding, a PES for effective water management on agricultural land was developed and tested. Building on the successful implementation in demonstration ranches, a state agency PES program was introduced in 2011 to promote output-based payments and regulate the selection of participating ranchers through a solicitation process.



Located in the extreme southeast of the United States, the Everglades are a vast, subtropical wetland area. Ranging from Orlando in the north and south to Florida Bay, the Everglades include the Kissimmee River and Lake Okeechobee, once the ‘liquid heart’ of the Everglades ecosystem, as well as adjoining estuaries to the east and west. In the 1940s, government agencies and private landowners began transforming the Everglades. They drained large areas of the region to facilitate agricultural production and human habitation. Original water inflows were cut off, areas were fragmented, and artificial canals and pumping systems were installed. This resulted in drastic changes to water supply and water flows and severe problems with the quality of surface- and groundwater. Intensive agriculture, particularly south and north of Lake Okeechobee, causes high eutrophication in downstream rivers, lakes and wetlands. In times of heavy rainfall, nutrient-rich freshwater is washed quickly through the artificial gate and lock systems into coastal waters. The increased freshwater flows affect salinity levels and water quality in the estuary, potentially causing environmen-

tal harm. Changing salinity can adversely impact seagrass and oyster populations. At the same time, the fresh water is lost from the Everglades ecosystem; it receives only a fraction of the water it requires, a large part of which is nevertheless loaded with excess nutrients, specifically phosphorus and nitrogen. This leads to the loss of habitats for endangered plant and animal species.

Cattle ranching is the main method of land use in the Northern Everglades region. North of Lake Okeechobee, watershed cattle ranches are mainly cow-calf operations on tracts of land that range from 500 to 5,000 hectares, with a handful of exceptions over 100,000 hectares. These large ranches are home to many common wildlife species and several federally endangered species. They also provide important wildlife movement corridors and support water recharge and storage. However, slim economic margins create pressure to convert ranches to more intensive agriculture or sell the tracts of land for real estate development.

To help address the significant water quality and flow problems, the World Wildlife Fund (WWF) and six ranchers formed an ad hoc group with the aim of identifying and exploring opportunities to recognize and enhance both the ecological value and the economic viability of cattle ranching in the region. They assessed the potential of on-ranch water management to provide water and phosphorus retention services in a cost-effective



manner in comparison to other options. The assessment not only showed significant potential to help address the problems with on-ranch water management but also identified the main challenges of program design and implementation that would need to be addressed: (i) defining the ecosystem services that would be paid for, (ii) methods to confirm that the service was indeed provided, and (iii) determining how payments for services would be made. At the same time, the program design had to address different aspects related to regulatory programs.

Ranchers and the WWF, scientists from various research institutions, as well as state and federal authorities began working together to successfully overcome these challenges. The latter were also prepared to pay for providing the service. In 2005, all the stakeholders signed a memorandum of understanding agreeing to work together to design a PES and start the Florida Ranchlands Environmental Services Project (FRESP). One important aim was to create an output-based PES. Accordingly, the services were to be transparent and measurable under actual agricultural conditions. This requirement led to the identification of two ecosystem services which could be produced on the ranches: (i) water storage through rainwater retention by maximizing groundwater seepage and (ii) removal of nutrients, especially phosphorus, from the water. To achieve the latter, water from public canals or rivers adjacent to the ranch is diverted into a natural or grazed area where it is stored and released slowly. It is finally returned with its nutrient content reduced.

To offer both services cost-efficiently, existing water management infrastructure was to be used with small adjustments wherever necessary. Water management alternatives (WMAs), combinations of management practices and construction like low-level berms and simple gravity water control structure, were

developed to increase or restore the hydrology within a defined area of a working ranch. These concepts were then tested on eight ranches with an area of about 315 to 138,400 hectares. To overcome the two other significant design challenges – documentation of services provided and the calculation of the payment – the FRESP developers initially intended to link the payment to the actual amount of water retained in the course of a year or to the reduced nutrient levels. Accordingly, tools were developed to analyze how much water is retained in the ranches and by how much nutrient content is reduced in the course of a year. However, both buyers and sellers had concerns that the provision of both services would be subject to unpredictable fluctuations due to the strong link with annual rainfall. The paying authorities were not able to create a financial plan to take account of such fluctuations. At the same time, the ranchers offering their land preferred a fixed annual source of income to compensate for other even more variable earnings.

To address these concerns, a model was designed to calculate annual water- and nutrient-retention based on average rainfall over ten years. A fixed annual payment was to be based on this forecast. The aim was to develop a precise but at the same time easy-to-use model which took account of specific local conditions, such as existing and planned land use and infrastructure. Data and information from the eight pilot projects were also used to develop and adapt the model.

Ultimately, however, payments for ranchers participating in FRESP were based on individual negotiations between the government agencies and providers. The payments were set according to the area used for FRESP and the time the ranchers spent during meetings, phone calls and individual discussions. Contracts run from five to ten years. The government author-

Florida Ranchlands Environmental Services Project (FRESP)

Region (area):

Northern Everglades, Florida, USA (1.4 million ha affected in total; implemented on about 4,700 ha)

Starting year (stage):

2005 (closed in 2012; led to the Northern Everglades Payment for Ecosystem Service Program)

Objective:

Improvement of water quality and water quantity

Beneficiary:

Residents of Florida represented by South Florida Water Management District (SFWMD), the Florida Department of Agriculture and Consumer Services (FDACS), the Florida Department of Environmental Protection (FDEP), the US Department of Agriculture (USDA) Natural Resources Conservation Services (NRCS), and the W. K. Kellogg Foundation

Service provider:

Ranchers

(Other) Intermediaries:

World Wildlife Fund (WWF), Resources For the Future (RFF), University of Florida Institute of Food and Agricultural Sciences (IFAS), MacArthur Agro-Ecology Research Center (MAERC), Archbold Biological Station, University of Central Florida, Florida Cattlemen's Association

Budget:

\$7 million for the six-year pilot phase

Payment arrangement:

Output-based payment sought, ultimately more input-based; level of payment based on opportunity and production costs, negotiated individually

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Many reptiles (including snakes and alligators) and amphibians (such as the green tree frog) find their home in the unique wetlands of the Everglades.

ities were responsible for the processing and administration of the contracts with participating ranchers. All experiences with FRESP participants were incorporated into the development and improvement of the PES design. In addition, scientists examined possible tradeoffs and enhancements with other ecosystem services.

Getting FRESP up and running was made possible thanks to funding provided by two National Resource Conservation Service grants and support from the South Florida Water Management District, the Florida Department of Agriculture and Consumer Services and the W.K. Kellogg Foundation. This money was used to install the water management infrastructure on the ranches and to collect and analyze data from each site. The project was managed by a dedicated WWF staff member, Sarah Lynch, supported by the non-profit research institute Resources for the Future.

The Northern Everglades Payment for Environmental Services Program (NE-PES) (see info box), which started in January 2011, was based on the ecological success of FRESP and the ‘learning-by-doing’ experiences of the participating ranchers. Those responsible for the NE-PES believe that the opportunities for a program accepted by both buyers and sellers equally have been significantly increased through FRESP. They now hope for greater public support for the PES approach in which ranchers are paid for providing water-related ecosystem services.

FRESP differs from other PES examples in that it had sufficient resources and broad support. Therefore, a detailed analysis of hard-to-measure ecosystem services was possible, as was testing the different possibilities and action options. This helped significantly minimize the transaction costs of the NE-PES Program based on FRESP.

The Northern Everglades Payment for Environmental Services (NE-PES) Program

The Northern Everglades Payment for Environmental Services Program (NE-PES) has its origin in FRESP but has adapted the PES design in some areas: It includes a solicitation process and a model-based, output-based payment scheme.

As part of the solicitation process, the NE-PES Program encourages eligible cattle ranchers in the Northern Everglades to promote water management alternatives on their lands in order to provide ecosystem services, such as water retention or nutrient (specifically phosphorus or nitrogen) reduction. Interested ranchers submit a draft of their proposed management alternative along with a corresponding payment claim. The offers are compared based on prescribed criteria, which also include the unit price for providing the service. Direct negotiations are then held between the buyer and the potential seller according to the resulting ranking.

On January 2011 the responsible agency, the South Florida Water Management District, issued the first tender. In total, 14 offers were submitted, each with a two-part payment structure: (a) the estimate of expected costs for the planning and implementation of the management alternatives, which are to be reimbursed as actually incurred costs, and (b) the annual service payment expected as part of a 10-year contract for service provision. Eight of these offers were selected and implemented. The budget for the eight 10-year contracts with participating ranchers came to a total of around \$ 7 million. The expected ecosystem services are calculated with the aid of a water resource model based on site-specific assessments of the proposed management alternatives and its operations. Ranchers must document the measures implemented and the ecosystem

services provided in order to receive their annual payment. In addition, they must demonstrate compliance with their contractual obligations each year on the basis of on-site checks.

As a PES program on a watershed scale the NE-PES commits to maintaining a working landscape. Ranchers are thereby encouraged to use and modify any existing system to produce the desired services in the most efficient and effective manner for their lands. The provision of these ecosystem services also enhances and increases the habitat for watershed wildlife. Besides, payments for provision of these services create income for ranchers providing incentive to continue their cow-calf operations, thereby forestalling conversion to more intensive agricultural and urban land uses.



*Interview with Benita Whalen,
Former head of the Department Agricultural Water
Programs in the South Florida Water Management District
and responsible for NE-PES*



What were the main reasons for creating the Northern Everglades Payment for Ecosystem Services Program (NE-PES) and what was your specific role in that?

The main reason for creating the NE-PES was to implement a cost-effective water resources improvement program that returned more water to the landscape and was also beneficial to the landowners in the watershed. I developed the South Florida Water Management District's (SFWMD) Dispersed Water Management Program which included participating in the collaborative FRESP initiative and was responsible for the development and implementation of the NE-PES Program. My role was to take what we learned and developed from FRESP and turn it into an SFWMD agency PES program. FRESP was a pilot project which was successful in obtaining federal and state funding to develop and prove the idea that the services of water retention and water quality improvement could be provided by ranchers in the Northern Everglades. So the FRESP ranchers weren't getting paid to provide services but instead to participate in a research PES development project: to design, construct and monitor water management facilities to help in the development of a PES program. It was crucial though that all the collaborating agencies and entities, all of our diverse stakeholder interests in Florida participated during that pilot project period

so that when issues or topics came up on how to move forward, everyone was able to give their input. That FRESP framework then helped the SFWMD actually develop and implement an agency of the state buyer PES program. Two state agencies actually had the FRESP pilot project contracts with the ranchers that participated but they weren't PES contracts yet, as FRESP's purpose was to develop the components of a PES program.

So the intention was there before the pilot started to make a state program out of it?

The agencies all had various programs of working with landowners to improve water resource issues but not specifically payment for services. I don't think very many PES projects worldwide have actually developed in the manner that NE-PES did. The intention of FRESP was to see if an effective PES program could be developed in the Northern Everglades. But the entire effort was taking a market-based program theory and turning it into an actual working program, which, at the time this was initiated, there weren't a lot of working programs, especially on the water resources perspective. FRESP was the investigation, the pilot implementation, monitoring, the stakeholders getting together, identifying key issues, to formulate and kind of prove the idea that water resources services could be obtained. And then NE-PES is the actual program to solicit market-based water retention and nutrient retention services in the Northern Everglades. That being a part of the process, taking what was learned in FRESP and using that as a foundation for NE-PES made it more acceptable, giving the stakeholders the comfort that the pieces that they identified during the FRESP pilot project were included within the NE-PES. But whoever is the buyer, as an agency of the state, there are certain

requirements that have to be followed. So in order to be fair and competitive, the SFWMD had to develop a solicitation. FRESF didn't have a formal procurement solicitation; FRESF was fortunate to have innovative ranchers that were willing to be pilot projects.

Why do you think FRESF was such a successful pilot-project?

The collaboration I think was the key. It was the variety of stakeholders with different interests that were engaged in the process that ensured that everyone's concerns would be addressed. So we had all the individuals and organizations that needed to participate participating, and all of them were of the mindset and fortitude to really make this effort work and be successful. All the stakeholders need to be comfortable and confident with what is being developed and the approach. There were several memorandums of understanding or agreements developed and I think that's another key component to any process. At the onset, everyone gets together and agrees that they will participate, which provides some level of commitment and defines their various roles.

Since the start of NE-PES, two solicitations have been released. What was the response?

We had, under the first solicitation, received 14 proposals. And eight water retention projects were awarded under the November 2011 solicitation. So eight NE-PES projects have been implemented or are near construction completion. Therefore, the projects are in year one or year two of their operation depending upon how long it took for permitting, construction, and getting the monitoring equipment in place. The second

solicitation that the SFWMD released received 19 responses and discussions are ongoing regarding the amount of funding that is available for those projects. The SFWMD has a governing board which makes the policy and budgetary decisions for the agency. The governing board initially identified two million dollars to start discussions and negotiations with the top-ranked project. Additional funds are in the process of being identified, and then it will be determined how many contracts are actually going to be awarded.

How does the future of NE-PES look? What do you hope to see?

There is still very much widespread support for the program. I believe there is continued evaluation being conducted as far as the more detailed cost-benefit type of evaluation because PES is not similar to the typical state/regional public facilities approach. I think any program or process should always be looking for ways to improve and continue to streamline, implement lessons learned, evaluate and update, which is what we did after the first solicitation, before releasing the second. There were revisions to some of the tools; there were changes to the



solicitation documents. The program needs to continually be in that cycle of self-improvement. With any of these programs, there needs to be a conscious effort to try to keep the administrative costs and any other costs, even monitoring, to a minimum so the program can implement more projects, maximize the funds towards the implementation and the service being provided.

Can NE-PES be used as a model for other PES programs?

I think it can be a model for other programs but I don't believe there are very many watersheds that you could just take the program as is and apply it. I was with the SFWMD for 21 years and had an additional five years with the federal government. I've always been involved in landowner initiatives, working with the people actually living in the watershed to get the results. I believe that is an important component of any program. Public facilities, big regional public facilities are necessary.

But I believe that you need to have the landowners within the watersheds engaged and participating to be able to meet watershed goals. So to apply a program like NE-PES, there is a lot of trust building, collaboration, discussions, data gathering, benchmarking, that needs to be done, so when you do go to put the program in place, it is positively received by all stakeholders. If the program process doesn't include engagement upfront, there is a much greater risk that it contains a flaw and therefore may not be successful.



“NE-PES was successful because it went through the FRESP project and made sure that any question or concern was addressed. If you leave anything out, if people don't think you have adequately addressed it, you are not going to get the participation from either the ranchers or the stakeholder groups.”



PEPA

PEPA was initiated by the environmental organization Winrock International in collaboration with several universities. Its aim is to improve the cost-effectiveness of agri-environmental programs. To this end, the initiative is developing and implementing different output-based payments approaches that motivate participating farmers to link farm management decisions more closely to environmental outcomes.



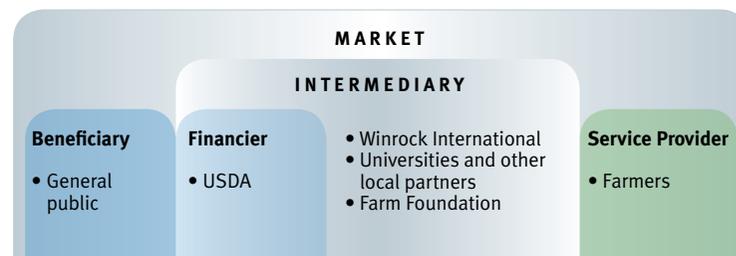
In the United States, as in many other countries, agriculture is the leading contributor of non-point source pollution in waterways. The current government programs to control agricultural pollution are focused on cost-sharing best-management practices and compensating farmers for idling selected tracts of working land. The payments are tied to specific land use practices and may not always provide a strong link between farm management and environmental outcomes. Therefore, the programs' effectiveness and efficiency are sometimes questioned. In 2001, Jonathan Winsten, an agricultural economist at the environmental organization Winrock International, started an initiative to help improve the cost-effectiveness of federal and state agri-environmental programs by enabling the development and use of output-based incentives.

A national workshop, funded by the Farm Foundation, kicked off the Performance-based Environmental Policies for Agriculture Initiative, PEPA, in 2003. The event brought together farmers from selected watersheds, representatives of federal and state agencies, scientists, staff of environmental organizations and policy makers. The opportunities and

Performance-based Environmental Policies for Agriculture Initiative

obstacles facing the implementation of effective, output-based PES to reduce water pollution from non-point sources were presented and discussed. Breakout sessions focused on developing usable strategies for output-based incentives which would then be tested. To this end, Winrock International received a Conservation Innovation Grant from the US Department of Agriculture (USDA) Natural Resources Conservation Service. In 2006, the pilot projects started in small watersheds of the Upper Mississippi River and Lake Champlain in Iowa and Vermont. Two different approaches were implemented under which the participating farmers received flexible, output-based payments. The different implementation strategies and cost effectiveness of the approaches were then assessed.

Approach 1 attempted to incorporate environmental outcomes into farm business decision-making. Therefore a specific payment was offered to participating farmers for meeting environmental targets. Payments were not tied to implementing any specific action or practice but were made for: (i) the estimated reduction of phosphorus loss from the farm, (ii) achieving total phosphorus loss below three pounds per acre (model-based estimation by the state's phosphorus index as a reference, with which most farmers are familiar), and (iii) demonstrating adequate nitrogen management (determined by measuring the nitrogen values via the end-of-season cornstalk nitrate test). Interested farmers initially met with project staff or a crop advisor to create or update the phosphorus index. Different scenarios were then identified



using one or more actions to reduce the expected phosphorus loss. For the time required to participate in this first phase the farmer received an expense allowance of \$ 400 to \$ 800. In the second phase, the various costs associated with each action to be taken by the farmer were calculated, including the cost for each pound of reduced phosphorus discharge and the resulting gain or loss from each scenario. Through this the farmer could gauge which actions are good business decisions. Phosphorus reduction actions included crop rotation strategies, manure/fertilizer management, sediment traps, as well as the renovation or replanting of riparian buffers. Actions that cost the farmer less than the incentive payment are considered to be good business decisions for the farm to implement. Due to the observation that initial phosphorus reductions were less costly to farmers in Iowa than to farmers in Vermont two different payment levels were defined: In Iowa, a farm received \$ 10 per pound of phosphorus loss reduced, in Vermont \$ 25. Approach 1 was tested in North Fork Headwaters in eastern Iowa, and the Hungerford Brook and Rock River watersheds in northwestern Vermont. Between 2007 and 2009, 27 farms participated in the project.

As part of approach 2 watershed councils met to make group decisions on program rules and payment levels. These councils were led by farmers and supported by advisors. The participating farms were paid on the basis of how much they reduced phosphorus, nitrogen and sediment loss. The payments were deposited into an account and made available to each council for distribution. Each farmer could opt for different reduction targets and select the appropriate actions to meet them. The reduction targets and requisite actions were compiled in a simple matrix. All or just a few of the listed points could be selected and paid for. The specific payment made to

the farmer was linked to the achievement of a specified target, and calculated based on a combination of actions and outcomes. The payments for the reduction of phosphorus, nitrogen and/or sediment loss ranged from between \$ 2.72 to \$ 3.20 per acre (= about 0.40 ha). Approach 2 was pilot-tested in Iowa's Coldwater-Palmer, Lime Creek, and Hewitt Creek watersheds. Just over 100 farms participated.

The results of the PEPA pilot projects were thoroughly evaluated and documented. They show large variation in cost-effectiveness among and within the categories of actions in approach 1 depending on the participating farm and varying greatly even from field to field. Not always the most cost-effective action was taken by the farmer. Choices have been based on farmer preferences, the specifics of any given farming operation and the varying levels of risk aversion. Among other conclusions, the PEPA team determined from this that a flexible, field-based PES approach was required. Moreover, the results showed that flexible, output-based payments motivated farmers to carefully consider environmental concerns in their business decision-making, and to implement the most effective actions specific to their farms. In the long term, this can also help to improve the viability of farms. The concept also generates participation, farmer enthusiasm, and leadership, which is particularly evident in the watershed councils used in approach 2. This seems to be particularly valuable in getting broader participation by farmers in environmental protection activities.

The PEPA initiative has done extensive education and outreach across the US on this subject. Winrock International is now conducting applied research projects on pay-for-performance conservation in Maryland and Puerto Rico that combine payments for greenhouse gas emissions reductions with

Performance-based Environmental Policies for Agriculture Initiative (PEPA)

Region (area):

Watersheds in Iowa, Vermont, Maryland, Wisconsin USA and in Puerto Rico (the watersheds usually entail an area of about 13,000 ha)

Starting year (stage):

2003 (ongoing, today: Pay-for-Performance Conservation Initiative)

Objective:

Improvement of water quality

Beneficiary:

General public represented by the US Department of Agriculture (USDA)

Service provider:

Farmers

(Other) Intermediaries:

Winrock International financially supported by Farm Foundation; local partners like universities, conservation districts and other

Budget:

\$ 3.5 million (across numerous projects)

Payment arrangement:

Output-based; level of payment is based on opportunity and production costs

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Performance-based Environmental Policies for Agriculture Initiative (PEPA)

nutrient loss reductions. PEPA has also prompted the USDA to test output-based PES in selected small watersheds. This is scheduled to begin in 2014 and may well prove to be an important step towards firmly establishing the concept in agri-environmental programs.



“The farmers need to see clearly that their actions affect the outcome and ideally only their actions. This means quantifying at the farm level. And there you often need to use models because measurement at the edge of fields is not practical on every farm.”

*Interview with Jonathan R. Winsten,
Project Leader for the PEPA Initiative*

“I think it is always better to include all the stakeholders from the beginning. And the farmers are probably the most important group of stakeholders. However, I don’t think that if you were to go ahead and design something without their input that means that the PES scheme wouldn’t work.”



What in your experience gets the idea of starting a new PES project going?

The first thing that comes to mind for me is the opportunity. If people are looking for a way to best deal with an environmental issue, I think that’s probably what gets them thinking about PES as an option. For example, people working for a conservation district who are struggling with an environmental issue, looking to solve a nutrient issue, and somebody suggests PES, they might say: Okay, let’s look at that. And then there are people who are PES people, people like me. I’m more a person with a tool in mind looking for applications of it. I’m not attached to place in that way. I have worked on this issue in a lot of different places and quite frankly I think I’ve been overly single-minded on this issue of paying for performance. But I haven’t really been thinking of it as much as a PES system because for me it’s more how can we improve the five billion dollars per year that we, the US, spend on agricultural non-point source pollution issues, and improve the outcomes. Currently, we pay for practices, and we don’t have any real sense of what the outcome is. That to me is a little ludicrous.

Do you think you need to include the target group, the farmers, right from the start of a new PES?

I think it is always better to include all the stakeholders from the beginning. And the farmers are probably the most important group of stakeholders. However, I don’t think that if you were to go ahead and design something without their input that means that the PES scheme wouldn’t work. But the way that we did it in our work was we found some places where there were acknowledged agriculturally related water-quality problems. For us, that was really important. If it is not acknowledged well

enough, the farmers would say: It's not us, it's the people with the failed septic tanks, etc. And if there is litigation going on related to water quality, then you are probably not going to get participation because nobody wants to share information. We found this situation in Northwest Arkansas.

But if it is acknowledged and the farmers understand: Okay, we do have some impact on this. Then they are willing to talk about it. And so in those places we worked with the local groups. It might have been a university extension or it might be a conservation district, whoever the group was that was mostly in the middle of the water quality issue. We worked with them and asked them to invite farmers to participate. We would use a room for 20-25 people. We would try to get 10 farmers there and representatives from all the relevant agencies, someone in a decision-making position to actually be there with us, understand what we're doing and participate in it. The US Department of Agriculture is so important, especially in the kind of work we're doing. If we developed this without them, it is very likely they would not have bought into it. Also, you have to get scientists in the room, usually from the land grant university, who understand the scientific linkages between what's happening on the farm and what's happening in the water. I think we did a really good job of bringing the right group of people together from the beginning.

How did you go on? Could you briefly describe the design process?

We would usually have a series of meetings with the same group of people in that specific watershed. We'd explain the background and the concept and why we think that pay-for-performance is a good idea. We'd ask the question of how we can

develop a system where we are paying for outcomes. And then the work of the group would be to help design how it would work locally. So, the questions are: What are the water quality issues we need to address and how are we going to quantify the performance? To just make it clear that it may be an estimated performance. But you do need some kind of science-based number, some kind of quantification. And then the issue of what the incentive will be. Are we talking about a financial payment that's directly related to the performance, or are we talking about some other kind of incentive?

You have to discuss those things in a series of meetings, two meetings, maybe sometimes three meetings over a period of a few months. Especially after the first meeting, most people at the table are hearing this concept for the first time. It is a little hard to wrap your head around the concept of paying for a performance vs. paying for practices. It can be confusing. So we give them some time to digest what was talked about and then come back together. I think ideally, you want to give people enough time to think about it and enough time for us or whoever the organizers are to do whatever homework that comes out of that meeting, such as to investigate prediction models or whatever.

So say it was just phosphorus, probably the single biggest question is: How are we going to quantify the performance? Are we going to try to measure something or are we going to use models? Are we going to do it at the mouth of the watershed? And almost all of the groups we worked with said we need this to be at the farm level. Otherwise there would be a disconnect for the farmers. The farmer would always wonder: Well, I could do all these changes but if the performance is measured downstream, the target may not be achieved. The farmers need to see

clearly that their actions affect the outcome and ideally only their actions. This means quantifying at the farm level. And there you often need to use models because measurement at the edge of fields is not practical on every farm.

We used the models to figure out the level of the payment. So, we used the Phosphorus Index on a bunch of farms and ran scenarios through the model with farmers that were interested in doing something. We calculated the costs of those changes and came up with cost-effectiveness, which is the cost in terms of dollars per pound of phosphorus loss reduction. And then, because we were in a very budget-constrained environment, a small grant, we wanted to set that price as low as we could but high enough that some of those scenarios would be good business decisions for the farm to make. That was it. But to be sure, the context that I'm talking about completely ignores the buyer side of things because we're assuming there's farm bill money. There is US conservation program money, and we're just trying to figure out a way to spend that more effectively.



Kooperationsmodell

Within the framework of the program initiated by the State of Lower Saxony, water utility companies and farmers are forming autonomous cooperations to safeguard and improve the quality of groundwater. As equal partners, they agree appropriate objectives and measures to be carried out by the farmers in areas where drinking water is protected. Water utility companies fund the measures via their contributions to the water extraction levy scheme.



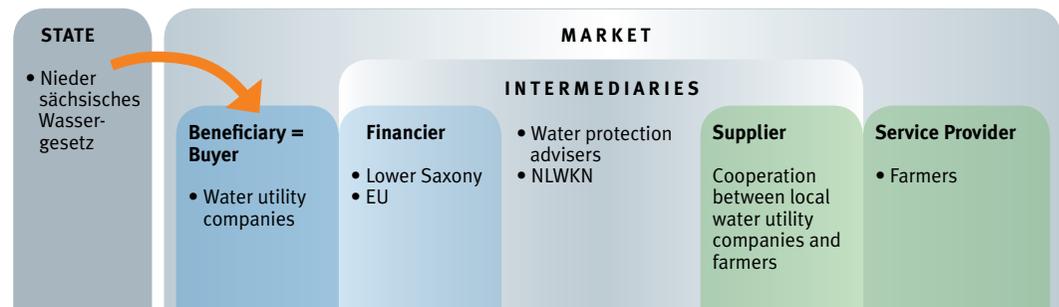
In Lower Saxony, one of the largest and most populous states in Germany, some 85 percent of drinking water is supplied by groundwater. Over 370 drinking water abstraction areas have been established throughout the state. At the same time, agriculture plays a highly important role in Lower Saxony, with nearly two-thirds of the state consisting of agricultural land. The intensive use of nitrogen fertilizers in these areas has a significant impact on the groundwater supply and thus the quality of drinking water. In a bid to safeguard and improve the quality of groundwater, the Kooperationsmodell Trinkwasserschutz (cooperation model for drinking water preservation) was initiated as part of the 1992 Niedersächsisches Wassergesetz (water act of Lower Saxony). This act introduced a levy for water extraction, and in the process created the basis for an organized cooperation between water management and agriculture in drinking water abstraction areas.

The levy for water extraction, known colloquially as the Wasserpfennig or Wassergroschen (water penny), has been applied in several German federal states for the extraction of ground and sur-

Niedersächsisches Kooperationsmodell Trinkwasserschutz

face water. In Lower Saxony, water utility companies, industrial firms and power plant operators must all pay fees to the state of between € 0.0026 and € 0.06 for each cubic meter of water taken depending on its origin and intended use. Overall, the annual revenue from the levy currently amounts to € 47 million. The funds raised are used for measures pertaining to nature conservation and water management as well as for the protection of waterways and water supply levels. A large part of the money goes to collaborations associated with protecting drinking water.

The aim of the Niedersächsisches Kooperationsmodell Trinkwasserschutz is to safeguard and improve the quality of groundwater, specifically so that nitrate levels are reduced along with the amount of pesticide and sulfate pollutants. **Funded cooperations are those where water utility companies work on an equal footing with farmers in drinking water abstraction areas. The business management of this type of cooperation is performed by the water utility company, who signs a grant agreement with the State of Lower Saxony.** The agreement sets down the formal and substantive requirements for the local cooperation, and defines targets and the amount of the grant. The term of the agreement is usually five years. The water utility companies and farmers agree on a work program as well as a conservation concept for their individual cooperation. The latter includes targets, detailed measures, the amount of payments to



Trinkwasserschutz

farmers and success parameters for the corresponding region. The conservation concept is a central part of the grant agreement, and provides the framework within which the parties autonomously carry out their respective duties. Conferences and work meetings are held regularly to allow the catalogs of measures to be amended and to record long-term developments in the area.

The main tool of the Niedersächsisches Kooperationsmodell Trinkwasserschutz is voluntary agreements signed by the water company and the farmers. The agreements describe contracted and funded agricultural management measures which go beyond the regular requirements of traditional agriculture. These measures include, for example, the reduction of nitrogen fertilization or the use of catch crops. The resulting loss of revenue and/or the necessary additional work are 100 percent financed by the state grant – primarily the levy for water extraction. Farmers can receive up to € 250 per hectare if they forgo the use of livestock manure, for example. However, these payments are explicitly not designed to function as an incentive or bonus, but only to compensate farmers for any financial loss. Participants choose their form of cooperation from a catalog of individual measures, and are then contractually obliged to comply with the agreed conditions for a period of five years.

The second important tool in the Kooperationsmodell Trinkwasserschutz is known as the Wasserschutzzusatzberatung (supplementary water protection consultation). This is a free form of consultation that informs farmers about the practical aspects of groundwater conservation. It includes events, newsletters, field trials and tours, group and individual advice, and covers aspects such as fertilizer planning. In addition to advising on water conservation, the water protection advisers

support local cooperations by assisting them with their contextual and organizational activities. **The advisers are primarily agricultural engineers and usually have many years of associated engineering experience or are members of the state's Chamber of Agriculture. They are familiar with the region and the specific areas, maintain contact with the farmers, and have developed a close relationship of trust with land management organizations.** The Wasserschutzzusatzberatung is funded by the State of Lower Saxony and the European Agricultural Fund for Rural Development (EAFRD).

The Lower Saxony State Department for Waterways, Coastal and Nature Conservation, NLWKN for short, specifies the technical framework of the Kooperationsmodell Trinkwasserschutz, and is entrusted with the administrative side of processing and evaluating the operations. The financial and environmental data converges here, where it is then evaluated. The water companies carefully check and document the groundwater quality at their own monitoring stations and wells. They are also responsible for the annual on-site inspections carried out on the farms. If contractual irregularities are discovered during this inspection process, any amounts previously received by the farmers must be repaid, but there are no further sanctions. A financial evaluation is performed as part of the annual report on the individual cooperations. A yearly budget of € 18 million is available to finance the activities carried out within the framework of the voluntary agreements and consultation. Of this amount, € 15 million comes from the levy for water extraction and € 3 million comes from the European Union. The funds are allocated according to a location-specific

Niedersächsisches Kooperationsmodell Trinkwasserschutz

Region (area):

Drinking water abstraction areas in Lower Saxony, Germany (approximately 300,000 ha)

Starting year (stage):

1992 (ongoing)

Objective:

Provision of clean drinking water

Beneficiary:

Water utility companies represented by the federal State of Lower Saxony acting as financier by using income from a levy for water extraction and the European Union (EU) in the context of agri-environmental programs

Service provider:

Farmers in cooperation with local water utility companies

(Other) Intermediaries:

Water protection advisers, Lower Saxon State Department for Waterway, Coastal and Nature Conservation (NLWKN)

Budget:

Currently approximately € 18 million per year

Payment arrangement:

Input-based, level of payment is based on opportunity and production costs

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priority scheme, whereby the individual drinking water abstraction areas are classified in terms of pedological site conditions and the existing ground and untreated water pollution levels, along with other technical aspects.

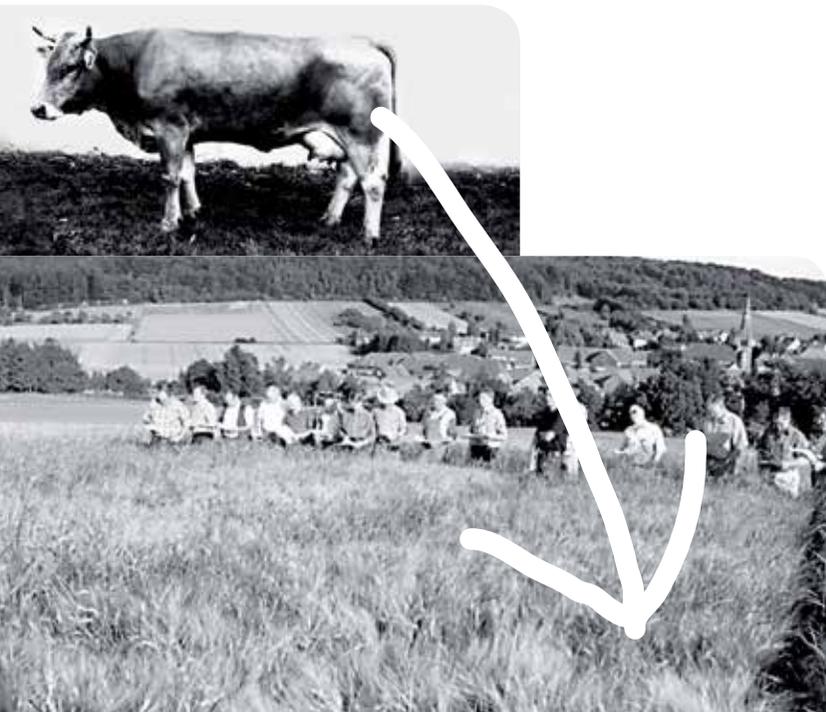
In 2013 there were 73 local collaborations through which water-saving management activities were funded on 304,000 hectares of land. This comprises nearly all the possible cropland and pastureland in Lower Saxony. The Niedersächsisches Kooperationsmodell Trinkwasserschutz is deemed to be very flexible despite the five year contract involved. The catalogs of measures of the cooperations can be adjusted every year, and existing contracts can be updated within the term of the agreement. It is interesting to note that the state only provides a general framework concerning the measures and payments. This can be put into place at a regional level and, as a result, adapted to suit local conditions. The model has been praised for its high degree of acceptance among the relevant parties, and for the noticeable ecological effect it has had. Nitrate levels in the drinking water abstraction areas have been on the decline for many years, as has the total amount of mineral fertilizer purchases and per-holding nitrate surplus levels. General agri-environmental measures have also been carried out in the water abstraction areas in addition to the voluntary cooperation agreements, which in turn have had a positive effect on the safeguarding of and improvement in groundwater quality. Those responsible for the Niedersächsisches Kooperationsmodell Trinkwasserschutz have furthermore initiated a pilot project to investigate whether farm-specific measures can be introduced in addition to the current location-specific measures in an effort to create a more output-based approach.

However, current developments, particularly in the livestock-rich regions of Lower Saxony, demonstrate the limits of the Kooperationsmodell Trinkwasserschutz: The conversion of grassland leads to an increase in groundwater nitrate loads. The increasing number of biogas plants or the associated high proportion of corn and the increased volume of digestate have the same effect. **In some regions of Lower Saxony the voluntary agreements no longer appear to be competitive due to the strong competition from economically attractive forms of cultivation, such as energy crops. In these regions voluntary agreements seem not to be the right way to reduce negative external effects on water ecosystem services. It is in these cases that the importance of regulatory law becomes particularly evident.**

Where economically attractive kinds of farming such as corn cultivation dominate and natural fertilizer is abundant, little can be achieved with voluntary agreements.



Interview with Dr. Markus Quirin from the Lower Saxony State Department for Water Management, Coastal Preservation and Nature Conservation, responsible for evaluating the overall project



Where do you see the real challenges for the project?

The greatest difficulties are in the Lower Saxony region with its high livestock density, particularly in Weser-Ems. There is a high rate of agricultural manure usage there, and digestate accumulates quickly due to the promotion of biogas plants. The pressure created by organic nitrogen carriers is much higher than in southern Lower Saxony, where predominantly cash-crop farms are found. It's also very difficult to improve the situation in this region via voluntary agreements. If farmers use a lot of organic manure, then voluntary agreements are of little help.

Are voluntary agreements financially attractive for farmers?

No, entering into a voluntary agreement should not have a financially positive impact for the farmer, but of course neither should it be negative. A farmer who farms his land extensively gets compensated for reduced profits and increased overheads. It should not have an incentivising effect, nor a deadweight effect either. Economically, it's a zero sum game for the farmer.

Are there any financial risks for the participating farmers?

In general, the risk is low. For more extensive management, we take the example of reduced nitrogen fertilization and calculate the amount to be compensated, whereby contribution margin calculations are made for income generated under conventional and reduced management approaches. Depending on how the year turns out for the farmer, it's possible that the compensation is insufficient. However, this should be the exception, and usually it's the case that the compensation is somewhat higher than the additional expenses or the reduced income. Apart from that, the farmer may make several voluntary agreements. He can carefully consider which one makes sense to him, and which one he doesn't want to sign.

How is the project perceived by the participants involved and the public?

The participants are mostly in favor. Water utility companies are very interested because at the end of the day it's about their drinking water, which is what they want to sell. They pay the levy for water extraction, and with the Kooperationsmodell, they have the chance to get back the money they have paid for their area while improving their groundwater. As a result, water utility companies are highly interested in this. It is also perceived positively by the farmers. Firstly, because they are protecting the drinking water, which they themselves consume, and secondly perhaps because there is also a lot of public pressure on farmers. They want to clearly show that yes, we are doing what we can to keep pollution levels low. In some communities and towns you realize that there's yet another kind of pressure. For example, if 90 percent of the farmers participate, then there is social pressure on the other ten percent to participate. And it is certainly perceived very positively by the public because they are able to see the resources and commitment that goes into protecting the drinking water supply.

What do you see as the main factors that have made the project successful?

The success is due to the combination of consultation and methodology. The one has required the other for the whole thing to be successful. And the relationship of trust between the farmers and the advisers has certainly helped. This plays a very important role. The advisers have accompanied the project from the start; they helped develop it and gained a foothold in the drinking water abstraction areas. The levels of trust between adviser and farmer have developed as a result, and this has

been pivotal for the success. Which means there are problems when, for various reasons, one adviser replaces another.

How will the model evolve in the future?

The measures are continually adapted in the collaborations to reflect actual circumstances as well as local priorities. For example, that might mean very intense action is taken only on areas that are highly susceptible to inputs. Therefore the available resources are used as effectively as possible. This is the goal of cooperation. From a state perspective, we are trying to think of additional measures that might enhance the positive aspects. At the moment we're testing, as part of a pilot project, to see if it's possible to move from location-specific measures to farm-specific measures. At the beginning we hoped to reduce nitrate fertilization across the board. Now we want to develop measures to reduce nitrogen fertilization at an individual farm level. The idea is to determine a nominal value for a farm, and if the farmer can reduce this value by ten percent, then he gets funding of, say, 60 euros per hectare. We have only just started down this path, but we've already seen progress.

Would you do something differently in the development of a new, similar project?

The design of such projects is not easy, and a project has to evolve over time. But the situation that we have at the moment is quite good and certainly worth pursuing. At the moment we are seeing some very similar trends in other areas. The Kooperationsmodell refers only to the drinking water abstraction areas, but at the moment we are also taking steps and going through consultations related to setting targets for the EU Water Framework Directive, which is geographically much larger.

The development taking place here is more or less what we initially saw in the drinking water catchment areas: Firstly, the advisers need to gain a foothold and build trust. Right from the beginning we have been more active in our support for the evaluation of the measures in setting targets for the Water Framework Directive than we were in the past. For this we're using the experience and the methodology from the Kooperationsmodell Trinkwasserschutz. For setting targets in the Water Framework Directive, we now have much improved data for evaluating the success of a project. This data was not particularly helpful when we started working with the drinking water abstraction areas. This was a weak point from which we have learned, and over time the data also improved through the work we performed in the drinking water abstraction areas.

What we haven't mentioned yet is the flip side of voluntary participation, namely regulatory law and what one can do with it. Regulatory law could be implemented much more than it has been in the past. There are examples of this in neighboring countries. Whether they're positive I wouldn't like to judge. I am thinking of Holland and Denmark, where the regulatory legislation has been very intense. Although you can't really transfer those conditions to Lower Saxony, I still think there is room for improvement in the field of regulatory law. And not necessarily just in the tightening of regulatory legislation, but more in the monitoring of the existing regulation, and also in the monitoring of compliance with the fertilizer recommendations set down by official sources. An increase in monitoring and more qualified monitoring could further improve the overall system of voluntary participation and regulatory legislation.

The fertilizer spreader is checked to verify the precise distribution of the fertilizer so as to avoid overfertilizing or underfertilizing.



CREP Vermont

The aim of this government PES is to reduce the amount of phosphorus entering several water bodies in the State of Vermont, including the important Lake Champlain. Farmers who cease production on environmentally sensitive agricultural lands and who implement special protection and maintenance practices receive attractive payments. In addition to federal, state and local authorities, environmental organizations are responsible for the acquisition and advisory support of farmers.



Lake Champlain is the sixth largest natural lake in the United States, covering an area of about 130,000 hectares. It is located within the borders of the states of Vermont and New York and the Canadian province of Quebec. It provides drinking water for about 250,000 people in the region and is a crucial link in the Hudson-Saint Lawrence waterway. Apart from this it is also considered a world-class fishery for salmonid species and bass. A pollution prevention, control, and restoration plan for Lake Champlain has been in place since 1996. One of its primary goals is to reduce excessive phosphorus inputs, resulting from agricultural and urban runoff to Lake Champlain. The Conservation Reserve Enhancement Program (CREP) in Vermont is one instrument used to achieve this goal.

CREP is a federal government program and an extension of the largest government agri-environmental program in the US, the Conservation Reserve Program (CRP, introduced in 1985). The specific objective of CREP is to improve the water quality of rivers and lakes. Accordingly, the owners of agricultural land in environmentally sensitive areas are motivated to maintain or set up riparian buffers and filter strips and/or to restore wetlands. CREP funding and participation depends on each state

Conservation Reserve Enhancement Program in Vermont

and county's environmental concern, with each determining its target amount of land to protect. A specific CREP is usually initiated after a state or local governmental, or local non-governmental entity has recognized an agriculture-related environmental issue of regional or national importance. In collaboration with the Farm Service Agency (FSA) of the US Department of Agriculture (USDA), these parties then develop a proposal to overcome these specific environmental problems in certain geographical regions by using selected practices. To date, CREP has been implemented in 33 states in the US.

CREP Vermont combines federal and state obligations of \$ 2.1 million over 15 years to protect environmentally sensitive land. \$ 640,000 has come from the State of Vermont, the rest from the federal government. The main concern is the establishment of conservation practices to reduce phosphorous loading to Lake Champlain by over 48 tons per year. In addition, the terrestrial and aquatic habitats of wild species are to be improved. The program provides financial incentives to encourage producers to voluntarily enroll in CRP-contracts. If farmers decide to participate, they stop agricultural production on land near water. Then, they plant native grasses, trees, and/or other vegetation to create buffer zones to prevent erosion and reduce the loss of nutrients and pollutants and, at the same time, to create habitats for many different wild species. CREP also supports farmers to develop and restore wetlands through the planting of appropriate groundcover.



CREP Vermont includes all 17 of the state's water catchment areas, including Lake Champlain and the Connecticut River. The aim is to incorporate a total of about 3,035 hectares of sensitive land into the program. The land must be cropland or pastureland adjacent to streams that lack adequate buffers to protect the water quality. To be eligible, the land must have been owned by the interested farmer for at least one year before enrolling for the program. Cropland must have been managed for four of the last six years. It may not be subject to any physical or legal usage restrictions. Enrollment for the program is possible at any time allowing farmers to join the program at any time rather than waiting for specific sign-up periods.

As compensation for setting aside the agricultural land, farmers receive an annual payment based on the land's average lease price in the respective region. Twice this average leasing price is paid for land made available to the program. In addition, a fee is paid for specific management practices. As well as a one-time payment after signing the contract, the FSA grants a 90 percent subsidy for the total cost of establishing riparian buffers and filter strips as well as for installing conservation practices, such as implementation of fencing or building stream crossings. The contracts run for 10 to 15 years. Within this period, the land must be maintained by the farmer as agreed.

Like CRP, CREP is administered by the FSA, with technical assistance provided by the USDA Natural Resources Conservation Service (NRCS) and local Soil and Water Conservation Districts. States government has supplemented the CREP budget with \$ 1 million over three years to fund outreach and assistance to landowners through third parties. One of them is Ducks Unlimited, a non-profit organization dedicated to the conserva-

tion of wetlands. Besides conducting wetland and forest conservation projects, Ducks Unlimited educates farmers and landowners and seeks to connect them to funding sources. Against this background, the NGO contributes to CREP by identifying appropriate sites and personally contacting landowners.

CREP has not been implemented successfully across the US, however. In some states, for example, the uptake of money available has been minimal. Vermont is considered to be a successful example of the implementation of CREP. Here eligible farmers take advantage of the program, firstly, because the advisors funded by the local government are available for personal discussions, and potential participants are made aware of the funding possibilities, sometimes via handwritten letters. Secondly, because CREP Vermont payments are very attractive to farmers: Often leaving their land fallow pays at least as well as cultivating it. Another benefit of CREP Vermont is that farmers in the supported areas can decide themselves at any time, without fixed deadlines, to participate in the program and determine which areas to include in the program.

Conservation Reserve Enhancement Program (CREP) in Vermont

Region (area):

Lake Champlain watershed as well as other watersheds in Vermont, USA (the goal is to enroll up to 3,035 ha of land)

Starting year (stage):

2004 (ongoing)

Objective:

Improvement of water quality

Beneficiary:

Residents of Vermont represented by the Farm Service Agency (FSA) of the US Department of Agriculture (USDA) and the State of Vermont

Service provider:

Farmers and landowners

(Other) Intermediaries:

USDA Natural Resources Conservation Services (NRCS), local Soil and Water Conservation Districts, environmental organizations like Ducks Unlimited and other external advisers

Budget:

\$ 2.1 million over 15 years for payments + \$ 1 million for outreach and assistance

Payment arrangement:

Input-based; level of payment is based on regional leasing prices as well as opportunity and production costs

Contact:

Fletcher (Kip) Potter

Kip.Potter@vt.usda.gov

www.fsa.usda.gov



*Interview with Fletcher (Kip) Potter,
Natural Resources Conservation Service
(NRCS) Colchester, Vermont,
Responsible, among other things, for
CREP Vermont*

*“We only work with farmers and
land-owners that are interested in
participating. Many of them have
secondary values around wildlife,
they may be hunters themselves, but
to be honest, the payments are a big
reason why they are interested
in participating.”*



I know some landowners are reluctant to work with the government. Can you tell me a bit about how that is working with the landowners in CREP?

We certainly have landowners that don't like to work with the government. We have some farmers out there that have never worked with any state or federal agency. And they have no intention of doing it in the future. But they are a fairly small percentage of the farmers. Some of it is just this general fear of the government, that farmers are just afraid to have government people on their land. They are afraid that these people may see something that they do not like, and that they would report them to other government agencies, and they are going to be told to do something because it is a regulated activity or something. So a lot is just this general fear of having government employees on your land and what may happen as a result of that. Most of it's not founded on any sort of fact.

But sometimes it is more complex, with CREP for instance: We have been quite successful in getting farmers to sign up and use the programs for creating a buffer and fencing the cows out of the stream. What has been more difficult for us is to get farmers to enroll cropland that is adjacent to streams into the program, even though we pay more for that. Often that cropland in the floodplains along the streams and rivers is the most productive land on their farm and they can remember when their father or their grandfather cleared all the trees out there so they could use it for crop production. These farmers are very reluctant to give up that land even though we offer very good rental rates and incentives for it.

Another part of the problem is that in some parts of the state, the available agricultural land is very limited, and it is very competitive for the farmers to get additional land. So they

know that if they give up say 10 acres of this highly productive corn land along the river and put it into CREP, into a buffer, that they probably won't be able to replace that with other land anywhere. So they will actually have to reduce the number of cows they have, because they are not going to have as much feed as they need, or need to buy more from the feed dealer to feed their cows. And then there are some folks out there, they just see it as a sort of charity payment and they just don't feel like they should be taking that money. They think if they're going to do those things, they should be doing them themselves. Some of our programs also require conservation compliance, for example. If you are going to participate in such a program, you have to control erosion from your highly erodible field, and you can't convert wetlands. And some people just don't want to be held to those requirements.

Are there farmers who feel that it is socially right that they are paid for these ecological provisions to society?

Certainly. Quite a number of farmers we do have participating in programs have come to the conclusion that they deserve to get paid for these practices. Certainly they benefit from some of the practices they implement. You know, it is improving soil quality in the long term, it is maintaining productivity of their fields, but there are some practices that really aren't providing the farmer any real benefit, like a filter along the stream. But it certainly is providing the public a very real benefit.

Who consults farmers on what they should do?

Well, we try to, regardless of who's out there, whether it is an NRCS employee or a state employee or a private contractor that is working with them as a consultant. Regardless who is



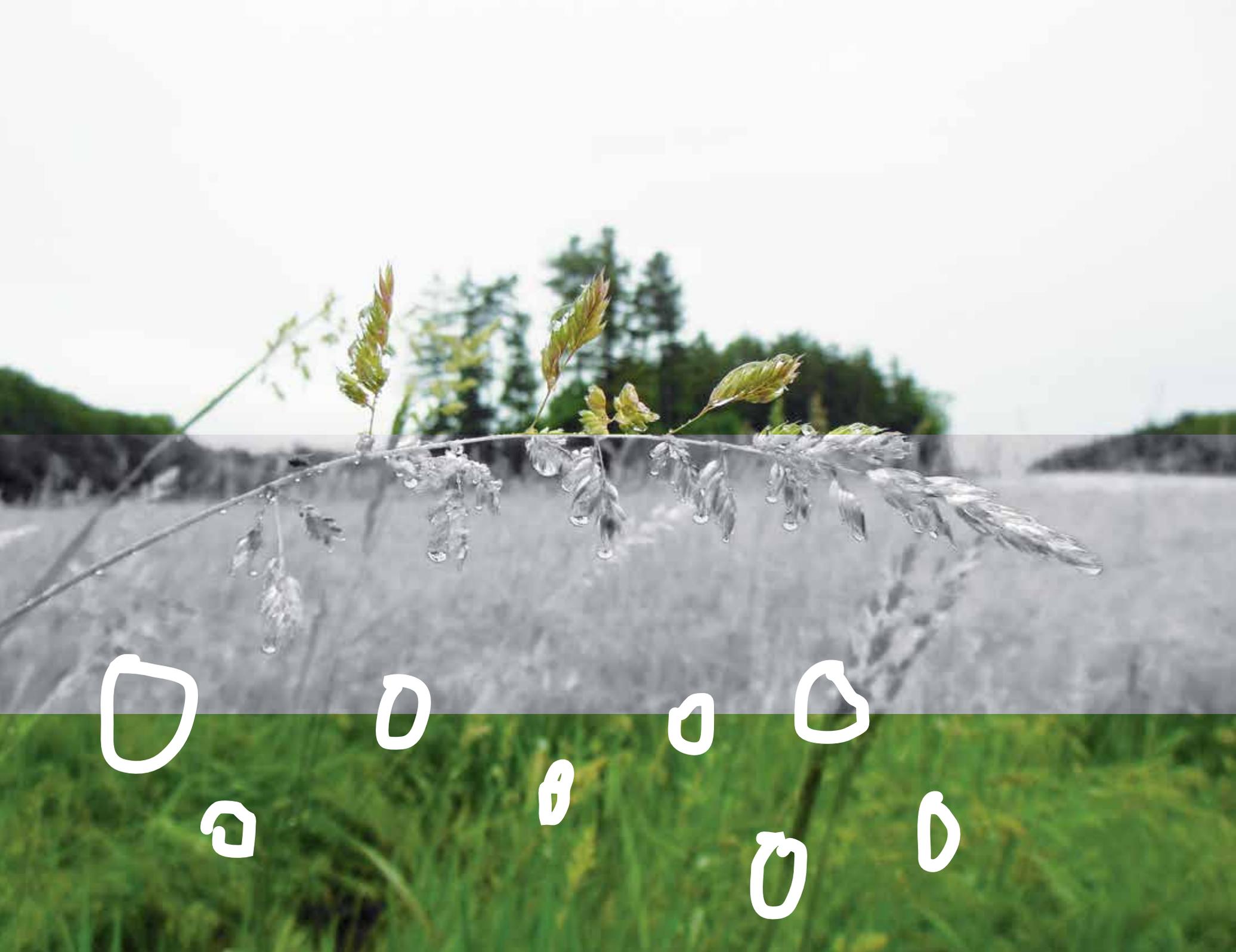
Conservation Reserve Enhancement Program (CREP) in Vermont

working out there with the farmers, we try to keep everybody informed of everybody else's programs. You try to sort of work that out with the farmers, let them know what their options are, then let them decide which of these best fits, what they want to do and need.

What do you think of the social justice and environmental effectiveness of conservation programs in general?

The whole package of the farm bill programs has had a tremendous impact on the environment here in the US for the last 20 years. Just for an example: the wildlife compliance program, commonly called Swampbuster. Part of that being initialized in 1985, the principle source of wetland conversion in the United States was agriculture. Agriculture was responsible for 60 to 70 percent of all the wetlands being converted. Since then, the matter of wetland conversion on agricultural lands has dropped significantly to the point that the urban sector is now the primary source of continued wetland conversions in the US. This is just one example, and you can go down the list as far as to the Wildlife Program or CRP, which has both water quality and wildlife benefits. Most of those programs have been very effective because of the very significant support of other organizations across the country. A lot of non-profits and groups that are environmental in orientation have recognized the importance of these programs, like Ducks Unlimited. We have been working closely with them. They are partnering with us at local levels and are also supporting the programs here at the national level.





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Mandatory polluter-fund

On the following pages we deal with successful PES examples in which demand results from regulatory requirements. The demand is forced either by mandatory environmental standards or by the legally established obligations to compensate negative impacts. The perpetrators of negative effects, and with it the buyers or financiers of these PES, are private individuals, companies or even local authorities.

Silvergate Mitigation Bank, United States

The Silvergate Mitigation Bank was the first commercial mitigation bank west of the Mississippi entitled to sell compensatory mitigation credits beginning in 1994. Together with the central, regional and local government authorities, the initiators created the institutional basis for the establishment of private habitat banks as a sound market mechanism to protect and enhance wetlands and habitats of endangered species.

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Medford Water Quality Trading Program, United States

The City of Medford finances riparian restoration projects to shade the Rogue River and thereby reduce stream warming caused by solar loading. Credits generated by the projects are used to meet thermal limits for influent wastewater set by a governmental permit for the City's Regional Water Reclamation Facility. The program is fully implemented by the environmental organization The Freshwater Trust, which leases the land, commissions the planting and sells the credits to the city.



Loss

\$



ed payments

Flächenagentur Brandenburg GmbH, Germany

Investors legally obliged to compensate for impacting on nature and landscapes pay the Flächenagentur for areas held in reserve and any compensation measures implemented. The agency obtains the required land from private landowners. Long-term compensation measures are often implemented by farmers who are paid for doing so. The agency acts as initiator, facilitator and supplier.



100 Äcker für die Vielfalt, Germany

The goal of the project, initiated by scientists, landscape conservationists and a nature protection foundation, is to establish a national network of conservation fields for wild arable plant species. Funds for financing land purchases and for paying farmers tending the land are acquired through a regionally specific mix of payments for compensation measures, agrienvironmental programs, and state and foundation resources.



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Forest Mitigation Banking, United States

The State of Maryland requires the replacement of trees cut during development. By voluntarily planting trees and permanently protecting woodlands, private landowners can create credits and deposit them in a forest mitigation bank. Project developers can then purchase these credits to meet their compensation obligations. Local authorities regulate and administer the program. An environmental organization supports it with innovative web-based tools.



Mandatory polluter-funded payments

On the next few pages, you will find successful examples of PES in which ‘demand’ is the result of regulatory requirements. The demand is forced either by mandatory environmental standards or by the legally established obligations to compensate negative impacts. The perpetrators of negative effects, and with it the buyers or financiers of these PES, are private individuals, companies or even local authorities. The main thing is that the perpetrators are given options for action they can take in order to comply with their obligations. In addition to other options, they can, for example, pay land-owners for offsetting the loss of function of the affected ecosystem services. But they can also consciously use ecosystem services to comply with environmental standards.

One very exciting example of this type is the *Medford Water Quality Trading Program*, in which a municipal waste water company achieves compliance with legally prescribed standards by paying for a land use variant that fosters natural water cooling. Examples of US habitat banking and its German counterpart are also included in this category: These include the story of one of the first commercial mitigation banks in the United States, the *Silvergate Mitigation Bank*, as well as the successful *Flächenagentur Brandenburg GmbH* in Germany and a description of *Forest Mitigation Banking in Maryland*. In all three cases, project developers required to undertake compensatory measures are given the opportunity to purchase offset measures to protect and develop biodiversity or to provide ecosystem services. In the United States, the compensation obligations relate to wetlands, to the habitats of endangered species, or to forests of a certain size. In Germany, on the other hand, every unavoidable negative influence on nature and landscape must be offset. The fifth example included in this category, *100 Äcker für die Vielfalt*,

dedicated to the conservation of biodiversity on German agricultural land, also uses the compensation payments flowing on the basis of this arrangement. The payments by project developers are, however, only one financing component among several other non-governmental and governmental payments. So the project could just as easily be included under voluntary non-governmental payments as under voluntary governmental payments and is a case for ‘the middle’, the group of special cases, if we had such a category. Solely on the basis of the testimony of the developers, according to whom the financial resources connected with the Eingriffs-Ausgleichsregelung make up the bulk of the available budget, we are presenting this example under the heading of mandatory polluter-funded payments.



Medford Water Qua

The City of Medford finances riparian restoration projects to shade the Rogue River and thereby reduce stream warming caused by solar loading. Credits generated by the projects are used to meet thermal limits for influent wastewater set by a governmental permit for the City's Regional Water Reclamation Facility. The program is fully implemented by the environmental organization The Freshwater Trust, which leases the land, commissions the planting and sells the credits to the city.

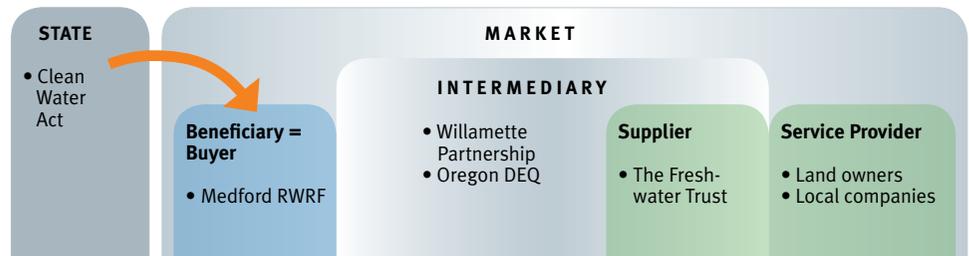


The City of Medford in Southern Oregon has a population of more than 76,000 in the metropolitan area. In the whole of Jackson County, nearly 170,000 residents are supplied by the city's water treatment plant. Medford is located near the Rogue River, which is protected as a National Wild and Scenic River and known for its wild scenery, whitewater rafting and salmon runs. As part of the Clean Water Act, however, many streams and lakes in the Rogue basin were placed on the state list of impaired water bodies and the Oregon Department of Environmental Quality (DEQ) was required to implement restrictions also known as Total Maximum Daily Loads (TMDL). A TMDL is a calculation of the maximum amount of one or more pollutants that a water body can receive and still meet water quality standards. In the Rogue Basin TMDLs are designed to address bacterial contamination and thermal load. The second, the temperature TMDL, is intended to protect salmon, rainbow trout and other cold-water fish.

When the National Pollutant Discharge Elimination System

(NPDES) permits for the City of Medford's Regional Water Reclamation Facility (RWRF) came up for renewal, a new effluent load limit was set for temperature that reduces over time, in order to achieve compliance with the thermal limits set in the permit. The Medford RWRF releases up to 76,000 m³ of treated, clean but warm water per day into the Rogue River. There is potential for the effluent discharge to exceed its thermal load limit especially during low-flow periods in the fall. Downstream, this could contribute to temperatures increasing at the point of maximum impact for the water body beyond the water quality criteria set by the TMDL.

In order to meet the NPDES temperature limits at all times of the year, treated water must be cooled before it can be discharged into the river. The City considered three methods for reducing thermal loading: (i) the storage in ponds or basins for discharge later in the year, (ii) mechanical chillers and (iii) riparian restoration and shading. The last option, riparian restoration, involves planting native plants and shrubs on private lands along the banks of a river to create shade and block solar loading on the Rogue River and its tributaries. In addition to reducing heat loading, riparian restoration offers ancillary environmental benefits such as habitat creation (e.g. trees for birds), increased complexity instream (e.g. woody debris falling into the water), and bank stabilization (e.g. reduced erosion and nutrient filtration from agricultural runoff). Riparian restoration creates jobs and supports the local economy while avoiding



Quality Trading Program

the associated energy and greenhouse gas emissions linked to large chillers. But it was not primarily the ancillary benefits that convinced the City of Medford to choose the third, ecological approach. The City chose the more cost and energy effective solution: At an estimated capital cost of six to \$ 8 million, the restoration program will cost almost one-half of what it would have cost to install large chillers.

The Freshwater Trust was contracted to develop and implement the water quality trading program. The Trust has 30 years' experience in river restoration and entered into a 20-year renewable contract with the City of Medford. The Trust now oversees Medford's trading program, including preliminary modeling of thermal uplift (improvements to the riparian zone) and all credit generating activities – from site selection to implementation through long-term monitoring and maintenance, third party verification, certification and credit registration procedures. Hence, the Trust (i) identifies and contacts individual landowners, (ii) secures lease agreements and then (iii) contracts with local nurseries and companies to perform riparian restoration work. The Trust also engages a neutral third party to oversee credit verification and certification before registering the credits online. The Trust maintains the restoration projects for the life of the credits (20 years). The registered credits for completed projects are sold following implementation and verification to the City of Medford. Thus, the contract with The Freshwater Trust allows the Medford RWRf engage in water-quality trading without hiring staff to implement and oversee the program.

Thermal credits are estimated using an innovative modeling tool that was developed by the Oregon DEQ, called Shade-A-Lator. This Microsoft Excel-based, solar routing model

uses GIS indicators and field observations to calculate base-line solar radiation flux and associated effective shade based on the geographic and vegetative characteristics of the stream channel. Due to the time it takes for planted riparian vegetation to achieve mature heights and full canopy cover (to block incoming solar radiation) DEQ established a 2-to-1 trading ratio. That means there is a safeguard against any project's failure to deliver the shade for which it was credited.

The aim of the Medford Water Quality Trading Program is to reduce 620,000,000 kilocalories of solar loading per day by restoring riparian shade in the Rogue River basin over the next 10 years of project implementation. During these ten years, the city of Medford will buy this daily reduction in the form of credits from the Trust. The agreed price per credit includes all costs for for implementing, continuously maintaining and monitoring the program as well as the annual lease payments to the landowners for a period of 20 years. The estimated capital costs to restore a river can be up to \$ 100,000 per mile plus overhead costs, project management costs, annual operation and maintenance costs, payments to landowners and other activities relating to the credits, such as verification and certification.

The Freshwater Trust plays a vital role in the success of this program. As the supplier, implementer and broker, the Trust is integral to the development of the water-quality trading program – the first to operate under new quality standards established by a collaborative group of government agencies and non-profit organizations. The Trust contractually assumes some financial liability if the program fails, saying that it will share the fines that the Medford RWRf faces if it doesn't fulfill its obligations.

Medford Water Quality Trading Program

Region (area):

Rogue River basin near Medford, Oregon, USA
(48.3 km of streambank restoration)

Starting year (stage):

2011 (ongoing)

Objective:

Improvement of water quality

Beneficiary:

Medford Regional Water Reclamation Facility (RWRf)

Service provider:

Land owners, local nurseries and companies represented by The Freshwater Trust

(Other) Intermediaries:

Willamette Partnership, Oregon Department of Environmental Quality (Oregon DEQ)

Budget:

\$6 - \$8 million

Payment arrangement:

Output-based; the level of payment is based on the prices for leasing the land, the production and management costs

Contact:

Alex Johnson

alex@thefreshwatertrust.org

www.thefreshwatertrust.org/conservation/water-quality-trading

The Willamette Partnership, a neutral third party, is another non-profit organization involved in the program. It certifies the riparian restoration and registers the credits. The Willamette Partnership (<http://willamettepartnership.org/>) is a coalition of leading environmental organizations, city, county, businesses, farm and scientist leaders who have come together in recent years to improve environmental protection in the Willamette Basin in Northwestern Oregon. Among other things, the organization develops market-driven tools for farmers to evaluate and participate in emerging ecosystem markets, to set priorities for restoration actions and maintain access to appropriate payments. Since the Willamette Partnership has developed and established new protocols and standards for offset credits in Oregon, the organization now acts as a monitoring body in the Medford Water Quality Trading Program. It ensures that the restoration actions, through which credits are generated, are sufficiently and thoroughly implemented. Other stakeholders, such as Craft3 and the Meyer Memorial Trust, have financially supported the Freshwater Trust, particularly in expanding capacities with which the organization successfully bid for the City of Medford's tender and was able to start implementation. However, all activities carried out as part of the trading program are financed by the City of Medford through the purchase of credits.

The Medford Water Quality Trading Program is not the first of its kind. Clean Water Services (CWS) launched a program in 2004 and have since planted more than four million native plants and shrubs along about 48.3 km of the Tualatin River and its tributaries. The framework of both Medford and CWS water quality trading programs were developed and approved by Oregon DEQ. However, CWS uses a different model in that

CWS operates their trading program internally. There are staff members dedicated to the water quality trading program's development and implementation at CWS. Medford's program, on the other hand, uses The Freshwater Trust as an intermediary for all aspects of the trading program from credit estimation to implementation and registration.

Today, other cities and utilities are exploring the possibilities of adopting water quality trading systems that use riparian restoration as an innovative approach to meeting state and federal standards for water temperature or, prospectively, nutrient reduction. Programs similar to Medford's or CWS' are a viable alternative for cities to avoid costly technological solutions and provide other significant benefits: In addition to enhancing wildlife habitat and riverside improvements, restoration programs result in landowner and community engagement as well as economic benefits for the local community. Thus, the Medford Water Quality Trading Program could be held up as an example of a win-win situation for business, community and the environment.



*Interview with Alex Johnson,
Director of the Ecosystem Credit Programs at The Freshwater Trust*

“How are we ever going to get enough money and focus, enough scale to actually do anything on that scope? The way you do that is create the standards, you create the incentives correctly and then you invite everybody into the market.”



Can you tell me a bit about the planning process of the program?

CWS started the first trade of its kind but, because it was seven years ago, the standards were different from today. They kick-started a lot of other interests especially from other regulated entities but also from a non-profit organization like the Willamette Partnership that said: Let's put in the effort to convene everybody that needs to agree on how these programs should develop. It took six years to get agreement on all the different pieces that create this credit. The Willamette Partnership established the standards, but they are not implementers. However, The Freshwater Trust as an implementer understood that the City of Medford didn't have the capacity or the interest to go out and do all this watershed analysis, contract with land-owners, nurseries, etc. and monitor the project. All those things are so far outside of the normal scope of work for a wastewater treatment plant manager that it's not practical for many facilities.

For what purpose do you use modeling tools like the Shade-A-Lator?

The current trading programs in Oregon estimate thermal offset credits using a heat model for watersheds, the Oregon Heat Source Model. It has been used by Oregon DEQ for over a decade and it has proven very effective. Heat Source takes in all different types of factors that affect a water body and Shade-A-Lator is basically a part of that

model that measures effective shade, or solar load blocked, on a water body. It uses either manual input in one of the earlier versions or now light and radar data that is taken from an airplane using reflected lasers. When you are looking at a site that you're about to plant a riparian zone on to offset the solar loading, with Shade-a-Lator you are able to model existing solar loading and calculate the improvement. The model tells you how many kilocalories per day of heat (via sunlight) are reaching that water body during the specific time period that you're looking at currently. And then you use the model to say: Alright, given what we're planting, this is the type of riparian zone that will exist 20 years from now and that improvement is the credit value.

Is it about the combination of trees or also the spatial analysis, and where you should put the riparian buffer? Where it is most effective?

The actual trading area is defined by the TMDL. If you're a point source in Oregon, you basically find out through the TMDL process where you can plant a project to create an offset, a thermal load reduction credit. With the model, you describe

the future canopy; this is the height it will be in 20 years, and this is the percent of shade it will create. So we use it to model how much sunlight will still reach that water body 20 years from now when that riparian zone is more matured. And then the difference between the future vegetation and the current baseline is what we can trade to a regulated entity to use for NPDES permit compliance. On this basis, those credits are valid to be traded and used in a compliance zone as soon as the plants are planted. So you don't have to wait 20 years until that riparian zone is tall and creating a bunch of shade. That was one of the key agreements that the regulators have agreed upon. As soon as the plants are in the ground, the project has been verified by a third-party verifier, and the credits have been registered on a registry, then those are ready to be used in the permits. The whole thing would be impossible without it. If you are a compliance buyer you simply cannot wait five, 10 or 15 years to buy credits. You need them now.

Internally, we use the Shade-A-Lator model to basically do broad watershed assessments to make sure, before we sign a contract for credit delivery, that the watershed that we're looking at, the service area, has enough restoration potential to generate those credits. With the Medford contract it was many times more than what we would need to generate. If it was a close thing, then we wouldn't feel so comfortable, we probably wouldn't have taken on a lot of the liability that we did. So certainly, building up to that contract, we'd do a lot of internal analysis, using those tools with a different mindset saying: Can we create these credits? What are these credits going to cost? How much is it going to cost for a mile of restoration under this new method of credit generation, because obviously this is very different than what we had been doing? The Freshwater Trust has

been around for 30 years now doing restoration projects that entire time, but it was in a grant world. You get grant dollars, philanthropic dollars, and you go out and do the best you can and the money runs out and you have to walk away from the project. That is how restoration has happened in a lot of ways for the past couple decades. But that doesn't work for compliance; this is an entirely different way to look at it. If you are a point source, you need something that is a lot more rigorous, that can be easily proven for the next 20 years that it exists. So that is kind of how we use the models.

Is the modeling part crucial for success?

I think it is very necessary for success, because I think for PES to work long-term, you need to be able to pay for outcomes rather than actions, right? But there needs to be a good amount of thought going into what outputs you want to pay for. My background is economics, I think of everything as incentivizing whichever action. So, with the Clean Water Act and regulations we have had in America for the last forty years, they've incentivized extremely risk averse point sources to go after the least risky thing that is going to get them in compliance, which has been the engineering solution, in the case of temperature the cooling tower or chiller. That is what they've been incentivized to do. But when setting up a PES trading program, there needs to be a lot of thought about what specifically is being incentivized. Models are very important for the success of these things because you should be incentivizing the functions, the outputs that come out of a good restoration action. But there is a balance; it's kind of everything in moderation. You don't want to put the whole program into the hands of the modeler, and you shouldn't be

relying on models to a point where it slows down and blocks the processes from happening.

How do you think these trading programs can be scaled up?

To see this thing scale up, we need more market participants and they don't have to be non-profits. If you set the standards sufficiently high, then it could be a purely profit-motivated actor. It doesn't matter what their motives are as long as the restoration actions are real and the benefits are quantifiable and there is sufficient monitoring over time to make sure that they exist over time. We want competition because that is the only way really that you're able to scale it up to actually equal the magnitude of the problem. In Oregon, 100 miles of stream may be restored each year. With 30,000 miles of streams that are impaired, and that's only for temperature, 100 is so very, very small. How are we ever going to get enough money and focus, enough scale to actually do anything on that scope? The way you do that is create the standards, you create the incentives correctly and then you invite everybody into the market.





Silvergate Mitigation

The Silvergate Mitigation Bank was the first commercial mitigation bank west of the Mississippi entitled to sell compensatory mitigation credits beginning in 1994. Together with the central, regional and local government authorities, the initiators created the institutional basis for the establishment of private habitat banks as a sound market mechanism to protect and enhance wetlands and habitats of endangered species.



In accordance with the Clean Water Act (CWA) and the Endangered Species Act (ESA), American legislation requires the prevention, mitigation or compensation of activities through which existing wetlands are altered or harmed, or the habitats of ESA-listed species are put at risk. Project developers planning an operation that would endanger a wetland or listed species must apply for a permit. They receive this permit once they have done as much as possible to reduce the negative effects on-site and offset any unavoidable impacts off-site. The goal is to replace the exact function, that is to evenly offset the project's negative impact(s) on the respective natural environment and its ecological value. Hence, offsets for activities carried out in wetlands must be located within the same watershed as the harmful impact.

To compensate unavoidable impacts on wetlands or the habitats of endangered species, project developers can create their own offsets. They can also pay a Fee In Lieu to an environmental organization which will finance future restoration work

elsewhere, or buy offset from a commercial wetland mitigation bank and/or from an endangered species bank, also known as a conservation bank. Mitigation banks are typically large wetlands, also consisting of several interconnected areas, that have been enhanced or newly created and are permanently protected. In contrast, the owners of a conservation bank create and maintain habitats for endangered species. The clear intention of both forms (also known collectively as 'habitat banks' in Europe) must be to provide mitigation for unavoidable project impacts.

These banks can be established by nonprofit organizations, government agencies or private individuals. The projects must meet certain financial and environmental requirements before credits are released to the bank for subsequent sale. The credits are defined as the ecological value associated with one acre (about 0.40 hectare) of the area. The price range is very high: In 2008, prices were between \$ 3,000 and \$ 653,000, with an average price of \$ 112,449. Buyers are basically persons or groups planning a project that will have negative impacts on wetlands or the habitats of endangered species. These include, for example, builders of residential and commercial real estate, power generation and distribution companies, governmental transport agencies, cities, the Department of Defense and other federal agencies.

The Silvergate Mitigation Bank was established in 1991 as the 'Wildlands Mitigation Bank' from Wildlands, Inc., one of the first companies to specialize in the development of mitigation



n Bank

banks. Wildland co-founder and President, Riley Swift, had witnessed for years vernal pool lands – typical for the region and vital for many species – being replaced by housing and commercial development. As a result, he came up with the idea of relocating these pools to replace those lost to development. He came to know of the term ‘mitigation banking’, a concept that had been tested over some years by government authorities. This provided both the name and the validation for the concept, thereby encouraging him to develop it further. Together with his partner and hunting colleague, Steve Morgan, Riley Swift began designing, planning and developing a wetland mitigation bank.

Historically, the Silvergate Mitigation Bank site in the north of California was a rolling grassland landscape containing a network of vernal pools and swales that drained into the Bear River. Wheat and barley had been grown here during the 1930s and possibly into the late 1940s. Agricultural production then shifted to rice and livestock grazing; more intensive farming practices were adopted. When Wildlands, Inc. bought the site, the land use was mainly rice production and irrigated pasture.

The planning process included the preparation of baseline technical studies, the identification of goals, objectives, and specifications for habitat creation. Once this was in place, Wildlands, Inc. could design the restoration plan, work with governmental agencies to obtain permits, draft agency agreements, and lastly, coordinate earthwork and revegetation. **The initial costs for the bank were borne by Wildlands, Inc. followed by income from credit sales. The value of each credit set initially was based on the company’s experience in constructing, maintaining and monitoring various habitat types in addition to land, design and permit costs, plus long-term management**

endowment contributions, and the need to make a profit to fund future projects. Later it was adjusted to reflect market forces. The notion was that a credit should cost the buyer an amount equivalent to the value of the land freed from mitigation obligations on a per acre basis.

The credits are purchased from the Wildlands, Inc. sales office with a price per acre that is fixed for particular types of wetland area or endangered species. The seller – the bank – is given all the relevant information concerning the compensation required by the agency or agencies. A sales agreement is then drawn up and enforced. Once payment has been made, the buyer receives a receipt which he or she submits to the appropriate agency to meet the permit requirement for compensation.

There are several state and federal agencies involved, such as the US Fish and Wildlife Service and US Department of the Army Corps of Engineers, the California Department of Fish and Game as well as the California Department of Water Resources. At the local level, the County of Placer Planning Department is involved. These agencies regularly visited the site during the first five years of establishment to verify that the habitat was taking shape in accordance with written performance standards. Additionally, the bank submitted annual reports to these agencies for a minimum of five years after the habitat construction of each phase was completed. To date, monitoring reports have been submitted to the state and federal agencies as well as the Wildlife Heritage Foundation – the holder of the perpetual conservation easement. The Wildlife Heritage Foundation holds easements encompassing more than 13,000 hectares in California – most of which are habitat conservation easements resulting from some form of mitigation for protected resources.

Silvergate Mitigation Bank

Region (area):

About 2 km west of Sheridan, California, USA (265 ha)

Starting year (stage):

1991, sale started 1994 (ongoing)

Objective:

Protection and enhancement of biodiversity

Beneficiary:

General public represented by developers who are required to compensate for the negative impact on wetlands and wildlife habitats

Service provider:

Wildlands, Inc. in partnership with Restoration Resources

(Other) Intermediaries:

Wildlife Heritage Foundation, US Fish and Wildlife Service (USFWS), US Army Corps of Engineers (USACE), US Environmental Protection Agency (EPA), California Department of Fish and Wildlife (CDFW), California Department of Water Resources (DWR), local authorities

Budget:

Land costs: \$ 2,000,000

Project design and permitting: \$ 350,000

Construction costs, approx.: \$ 3,750,000

Initial maintenance, monitoring and reporting costs: \$ 900,000

On-going habitat management costs: \$ 50,000 per year.

Payment arrangement:

Input- or output-based, depending on the type of credit; the level of payment is based on production costs, intended profit and demand

Contact:

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www.restoration-resources.net/projects/showcase.php#project1

Silvergate Mitigation Bank



After Riley Swift left Wildlands, Inc., the Wildlands Mitigation Bank became the 'Silvergate Mitigation Bank' managed by Sierra View Landscape, Inc., which now operates under the name Restoration Resources, Inc. Presently it is not only a mitigation bank but also an endangered species bank and supports more than 23 hectares of created vernal pool habitats, 87 hectares of swampland, 14 hectares of wetlands and woodland areas near rivers, 26 hectares of habitat for the Valley Elderberry Longhorn Beetle and 126 hectares of restored single- and multi-year grassland. The site provides a habitat for a variety of native plants and wildlife. This includes 19 species listed at state and federal level. The areas are also used for the outdoor education program of the Wildlife Heritage Foundation.

The Silvergate Mitigation Bank was the first commercial mitigation bank in California. The bank created many of the institutional prerequisites for national, state and local agencies to establish and use such banks. In 2006, the number of mitigation banks in the US was estimated at around 500. For its implementation, the organizers of the Silvergate (Wildlands) Mitigation Bank were named 'Environmentalists of the year 1996' by the California Environmental Protection Agency.



*Excerpt from an email from
Riley Swift, President of Restoration
Resources and initiator of the
Silvergate Mitigation Bank in
Sheridan, about the founding of
the Wildlands Mitigation Bank*

At the time the Wildlands Mitigation Bank (today: Silvergate) was established, there were 'no rules' because mitigation banking was only an idea and no actual banks existed. Being a trained wildlife biologist and landscape contractor and not knowing any better, I decided in 1989 that I could relocate wetlands slated for destruction to another site where the plants and animals displaced could live out their lives, have lots of progeny, and be protected in perpetuity. It was a simple thought based upon the fact that the federal Clean Water Act had become the law of the land in 1986 providing protection for all 'waters of the US and wetlands' but no one was actually doing much about it in California. I believed that I could do the work mandated by the government as a private business and serve other private businesses and public agencies that needed to provide viable mitigation for unavoidable impacts to protected resources. In doing so, I found a partner with a true entrepreneurial spirit and we formed Wildlands, Inc. in 1991.

It took several years to get the regulatory agencies to agree to give mitigation banking a chance and, after my partner found a suitable plot of land, I designed a habitat restoration/creation project that would yield the kinds of credits that the market in our growing region needed. In the fall of 1994, we finally secured agency acceptance and were permitted to build the first phase of the plan and begin selling mitigation credits. At that

time, we decided that this bank needed to be a spectacular success as a habitat creation site in order to develop a market for mitigation credit sales and achieve full regulatory agency buy-in to the concept of mitigation banking.

Today, mitigation bank credits are the first choice of federal agencies for compensatory mitigation by project proponents. And Wildlands Mitigation Bank is extraordinarily successful as measured by maturing, sustainable, native habitats and their occupancy by numerous rare, threatened and endangered plant and animal species appropriate to our region. Wildlands Mitigation Bank was also a very successful financial enterprise and Wildlands, Inc. became a very successful business known throughout the US for its many successful mitigation banks.



Flächenagentur Bra

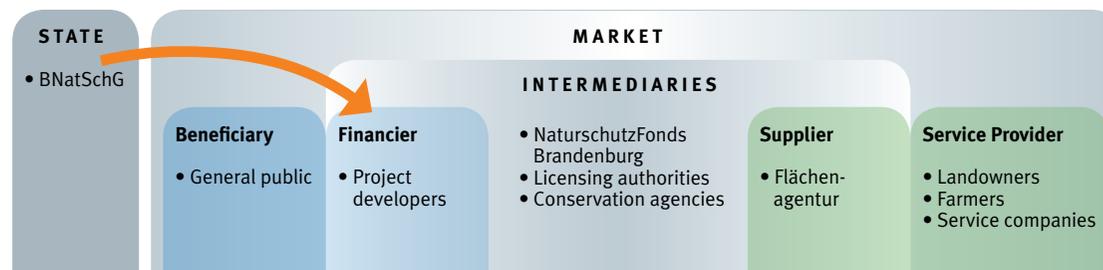
Investors legally obliged to compensate for impacting on nature and landscapes pay the Flächenagentur for areas held in reserve and any compensation measures implemented. The agency obtains the required land from private landowners. Long-term compensation measures are often implemented by farmers who are paid for doing so. The agency acts as initiator, facilitator and supplier.



The concept of Flächenpools (land pools) – in some federal states also known as Ökokonten (green accounts) – is relatively new in Germany. Its legal basis is the Eingriffs-Ausgleichsregelung (impact mitigation regulation) contained in the Federal Nature Conservation Act (BNatSchG), which has been in existence since the 1970s. The 2010 amendment refers to Flächenpools/Ökokonten. According to the regulation, preventable adverse effects on nature and landscapes are basically prohibited. If adverse effects are unavoidable, they must be compensated for long-term with nature conservation measures and landscape management. Either compensation is made by offsetting the adverse effect on the ecosystem promptly and in the same place it occurred or an equivalent compensation is made in which the adversely affected ecosystem nearby is improved or nature and landscapes elsewhere are improved in the long term. The biggest problem with the practical implementation of

this regulation is the shortage of land available for these compensation measures. Those responsible for the adverse impact are liable for long-term compensation. If they are unable to provide a suitable area, Flächenagenturen (land agencies) offer for sale pools of suitable compensation areas and the corresponding compensation measures. Flächenagenturen frequently implemented compensation measures on the contiguous land in advance. The investor can then use this land to comply with its obligations.

The Flächenagentur Brandenburg GmbH was founded when the accessibility and infrastructural development of former East German states was promoted as part of the “Deutsche Einheit” transport project. This project led to massive interventions in the natural environment. The government’s Ministry of Transport sought solutions in cooperation with Berlin’s then Waterways and Shipping Directorate and, at the end of the 1990s, financed a feasibility study. In 2002 the Flächenagentur Brandenburg GmbH was founded as part of a development and piloting project sponsored by the Bundesamt für Naturschutz (BfN, Federal Agency for Nature Conservation), the State of Brandenburg and the state foundation NaturSchutzFonds Brandenburg. The Flächenagentur has been operating as an independent subsidiary of NaturSchutzFonds Brandenburg since 2004. The Flächenagentur Brandenburg GmbH now implements measures such as extensifying agricultural land, structuring landscapes and restoring bodies of water, on a total of approximately 1,000 hectares. As well as developing, planning



Flächenagentur Brandenburg GmbH

and implementing ideas, it is also responsible for long-term land maintenance. In accordance with legislative requirements, its aim is to ensure offsetting and compensation measures over a period of 25 years. This corresponds to the duration of the compensation measures offered. Private and public project developers buy parts of it for their mitigation balances.

As a first step, qualified staff evaluates potential areas of land to ensure their suitability (in terms of soil, climate, water and landscape) for the compensation measures. If the potential can be defined clearly, discussions are held with the respective landowners over the terms of a voluntary transfer of ownership. The land is either, as in the majority of cases, purchased for the benefit of the NaturSchutzFonds Brandenburg, and therefore permanently protected for nature conservation use, or an easement agreement is made to consign the land to nature conservation for at least 25 years with a corresponding entry into the register of deeds. The corresponding pricing is based on current property market reports for Brandenburg. However, pricing is individually negotiated and also coordinated with local agricultural businesses to avoid distorting the price structure.

Specific measures are only planned once the habitat types have been mapped and an inventory of species has been conducted. Possible measures include setting aside agricultural land or extensifying its use, clearing succession areas, undertaking hydraulic-engineering measures to preserve or increase water levels, planting field hedges and hemming, restoring river bends or creating small bodies of water, as well as undertaking initial afforestation and forest conversion or maintenance measures. It is mostly local businesses that have been commissioned to implement these measures. If long-term maintenance is necessary, it is often carried out through so-called Produktions-

integrierte Maßnahmen (production-integrated compensation measures) by the farmers already working the land.

The Flächenagentur Brandenburg GmbH tries to intervene as little as possible in the existing land use structure and leave the tenants on the land. Accordingly, the planned measures are examined to ensure they fit with the management concept of the existing users. It is also necessary to consult with the farmers who will implement these measures voluntarily and discuss their payment. The amount and terms of payment are negotiated individually. Progress is monitored with annual activity reports compiled by the farmers responsible for regularly maintaining the open habitat. In addition, the agency also checks that these are submitted regularly. If the species inventory changes dramatically in certain Flächenpools, additional experts are called in. In case of breach of contract, the farmer must expect payments to be suspended. The agency itself compiles annual statements of account not only for its shareholders but also for the corresponding licensing agencies.

The compensation measures are based on a full cost calculation for the whole duration of the measures and offered to private and public project developers for their mitigation balances. The sale is financed by the Flächenagentur, which currently has seven employees; there are no additional subsidies, donations or grants. For each project there is a project manager who is very familiar with the local conditions and is closely rooted in the areas covered.

The Flächenagentur Brandenburg GmbH is considered a very good example of successful implementation of the Flächenpool concept. Its services are preferred not only by project developers, who can quickly and affordably meet their obligations using the agency; the licensing agencies responsible for assigning

Flächenagentur Brandenburg GmbH

Region (area):

Agricultural landscapes and peatlands in Brandenburg, Germany (currently about 1,000 hectares)

Starting year (stage):

2002 (ongoing)

Objective:

Enhancing multiple ecosystem services and biodiversity

Beneficiary:

General public represented by developers legally obliged to compensate for impacting on nature and landscapes

Service provider:

Landowners, farmers, service companies represented by the Flächenagentur Brandenburg GmbH

(Other) Intermediaries:

State foundation NaturschutzFonds Brandenburg, licensing agencies, conservation agencies

Budget:

The company's personnel costs are approx. € 260,000 per year; current turnover is approx. € 600,000 per year

Payment arrangement:

Input-based, level of payment is based on cost of securing the land and production cost (producer surplus is possible), with maintenance by farmers based on opportunity and production costs

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compensation measures to project developers are increasingly using the company's services. The successful development of the Flächenagentur Brandenburg GmbH was significantly influenced by the managing director of the company, Anne Schöps. She is also CEO of the Bundesverband der Flächenagenturen in Deutschland e.V. (Federal Association of Land Agencies in Germany), which was founded in 2006 and now has 25 members nationwide creating a broad exchange network. The Flächenagentur has also been providing MoorFutures for Brandenburg since May 2012.

*Interview with Anne Schöps,
Director of the Flächenagentur
Brandenburg GmbH*

“To successfully offer and market land pools, direct customer contact is essential, that is, contact with project developers and agencies.”



What did you consider important in the conceptual development of the Flächenagentur?

At the beginning of the preliminary study, we focused on conducting an analysis of needs among the project developers to gauge how much interest there was in combining compensation measures. In addition, we needed to find parameters to describe the ecological appreciation potential of the conservation measures to be offered. Not least, the implementation probability, that is the availability of the land, played a major role. In the agency's start-up phase, it turned out that the analysis of needs weren't very reliable and the grids created to evaluate the measures were too theoretical and abstract. To successfully offer and market land pools, direct customer contact is essential, that is, contact with project developers and agencies. Also, a close and trusting cooperation with land users and owners is crucial to determining land availability. You can only implement measures on land that has been made avail-

Project discussion on the Kleine Elster.



able and that has the potential to be improved from a nature conservation perspective. It is only possible to develop all that by assessing the land on site, looking for a reliable partner, and properly documenting the whole thing.

What were the specific challenges or even difficulties in implementing that?

I would not use the word ‘difficulties’. But I can tell you where the most work and the most persuading had to be done: It was always where nature conservation requirements and agricultural benefits intersected! This is an area where both parties need to be very constructive and willing to make compromises and where it has taken a long time to build a relationship of trust, especially with the farming unions. Prior to starting the Flächenagentur, we were worried that we wouldn’t find any farm businesses willing to make their land available in return for money or compensation. This area of conflict was addressed fairly early on and we resolved the problem in as much as we sought to make agriculture our partner and cooperate with businesses. This has resulted in close working relationships.

The second area of potential conflict has proved to be the shortage of water in the State of Brandenburg. This has been caused, on the one hand, by the discontinuation of open pit mining and the resulting absence of mine water which has impacted the supply of water to rivers in the north-east of Brandenburg. On the other hand, due to the settling of the peat-land soil, rewetting the mineral-rich marshland seemed impossible. Also, the question was whether soil structures could be improved at all by elevating the groundwater. The water issue is one that still requires a massive amount of groundwork and follow-up work.

How big is the demand for compensation measures?

Big! We currently have about one thousand hectares on offer and there is a lot of active demand for them. Demand is increasing. If we had more land, we could make even more land available, especially to private project developers. If they need compensation measures, using Flächenpools accelerates the approval process and usually turns out to be cost-effective. Wind farm operators or linear infrastructure projects have so many difficulties with on-site construction measures or the acceptance of construction measures that they are really happy if someone else takes on the job of looking for compensation and replacement measures. Consequently, they are increasingly coming directly to us. Public project developers rarely come to us. They frequently say that public procurement law is an obstacle. It is also partly because the public administration usually has its own staff that do the property management, construction and planning themselves.

Do landowners come directly to you and offer you land or do you always have to go looking for them?

Both. We have areas where we have become proactive on planning and technical implementation, mostly due to hints from nature conservation agencies. We then try to interest landowners in our project and find partners in the region concerned. Or there are people who see our work, think it’s good, and then come to us. These are two categories. The third one is owners, particularly older people, saying, “I don’t want any corn on my land, I want something else. But I’m too old to grow it myself.” Then they sell us their land on the condition that we really do develop it from a nature conservation perspective.

Do you notice the demand for cropland that is being talked about so much?

Yes, it's immense! In the past, we paid 35 cents per square meter for a field and thought it was expensive, but that land would cost 1.35 euros today. Things have changed a lot. Against this background, we have also noticed that the number of areas being secured through an entry in the register of deeds and not through purchase is rising, and we are increasingly asking the question, "For how long?" We always try to stipulate indefinite easements on the land. But increasingly, there are owners who look at how long the Eingriffs-Ausgleichsregelung applies, that's 25 years, and then try to negotiate it with us. It's important because it's used to calculate the amount of payment. Owners frequently think they will get payment equivalent to the purchase price when they register an easement. But that is not the case. They receive approximately 30 percent. If it's a small area and it's not worth going to a notary about then we might pay more. We pay less for larger areas. That's all negotiated individually and depends on the respective provider. To do this, I just need to know: Is that a grandma who wants to pay for her grandson's driving license? Or is that a farmer who needs to finance his or her stable and actually needs the land? In addition, we always agree on a long-term lease at the time of purchase. It's a very delicate set-up. The huge advantage is that as a private limited company we have this margin of discretion. Nobody tells us what to do.

In Brandenburg, you have rejected the economic term Ökokonten, which is often used in other federal states in connection with Flächenpools. Why?

An Ökokonto means that I deal in points. I assess my measures with Ökopunkten (green points) and say, "Measure XY has 20 points and if I add something to it, it gets 30 points." So, it's about allocating points. The project developer comes with a deficit and I convert it one to one. This is not yet in place in the State of Brandenburg because here we work with verbal arguments: Project developers must indicate what impacts their projects cause and we have to look at it from a conservation and functional perspective and decide what measures we can offer. So it's a different kind of balance. Nevertheless, it is of course the case that we are clearly economically oriented in terms of the contract inventory. This means working out net and gross prices and expecting specific payment terms. It's all very businesslike and may also be disconcerting for many conservationists.

What do you think has led to the success of the Flächenagentur Brandenburg GmbH ?

That we have taken seriously the concerns and needs of the local people with whom I want to work long-term. We really just try to see what the deal breakers are for a farmer, and for an owner. A second area of success is that the form of our organization makes us very autonomous. We are very flexible due to our financial management and because our organization is a limited liability company. And we have a great team of motivated and very action-oriented people who are simply very interested in nature conservation. So this personal commitment, taking individual concerns seriously and being willing to compromise, I think these are the keys to our success.

Hydraulic engineering measures serve to maintain or raise water levels, restore river bends or create small ponds.



Forest Mitigation B

The State of Maryland requires the replacement of trees cut during development. By voluntarily planting trees and permanently protecting woodlands, private landowners can create credits and deposit them in a forest mitigation bank. Project developers can then purchase these credits to meet their compensation obligations. Local authorities regulate and administer the program. An environmental organization supports it with innovative web-based tools.



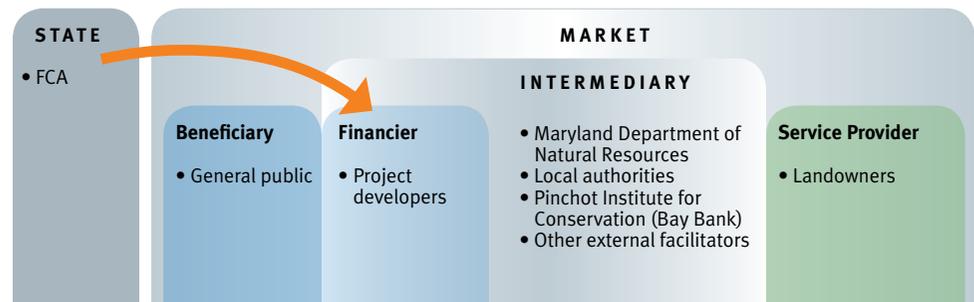
Since the 1980s, urban and suburban development in the Chesapeake Bay has led to the conversion of large tracts of forest. Between 1950 and 2011, Maryland lost an average of 2,800 hectares of forest per year. This had a significant impact on the scenery and wildlife habitats as well as the air, soil and especially water quality in the Chesapeake Bay. Today, Maryland has 40 percent forest coverage, with two thirds of that being owned by families, the forest industry and other related non-governmental organizations. Forest Mitigation Banking is designed for the parcels of land belonging to approximately 24,000 private forest landowners in Maryland, and aims to restore or create forested land expressly for the purpose of providing credits for the reforestation requirements of future activities.

In 1991 the State of Maryland passed the Forest Conservation Act (FCA) in order to minimize the loss of forest areas incurred through land conversions, to preserve forests in their location, and to protect environmentally sensitive areas. The FCA does not include a No

Net Loss policy for forests, and is therefore not intended to completely prevent forest loss. The Act does, however, require residential or commercial developers that convert forest land of more than 0.4 hectare, either through land clearing, sealing, leveling or sediment depositing, to reforest and/or leave certain tracts of forest in place. This does not include commercial logging in areas where no development is planned within five years of the clearing.

The preferred form of offsetting is to reforest on-site. If this is not possible, the required offsetting can also be done off-site. In this case, developers can fall back on credits from a forest mitigation bank. This option was included as part of the FCA revision in 1993. Two different possibilities are available: forest retention banks, which are those geared towards securing the long-term sustainability of forest areas through the issuance of conservation easements, i.e. agreements regarding permanent land management obligations; and forest creation banks, being those banks set up for the establishment of new forests. Where neither on-site offsetting nor replanting off-site is feasible, a kind of substitute payment, called Fee In Lieu, can be paid. This compensation fee then flows into a forest conservation fund that finances reforestation activities carried out by local authorities.

In terms of administration, the Maryland Department of Natural Resources, Forest Service Division is responsible for the FCA, while county or municipal agencies are responsible for the Act's implementation. These bodies are responsible for FCA standards'



Banking in Maryland

compliance. They can also introduce stricter guidelines. For this reason, there are widely differing forest mitigation rules among counties. The individual counties also determine the extent to which areas are to be reforested or retained, and whether compensation via forest mitigation banks in the respective counties is even possible. **Currently 12 of the 24 counties in Maryland have enacted specific forest mitigation banking rules which specify when and for what reason compensation measures offered by banks may be used, who may establish such banks, and on what areas.**

Generally, a forest mitigation bank must be located in a priority area as identified by the FCA and a local jurisdiction. Priority areas have sensitive environmental resources like floodplains, rare wildlife and plants, etc. Private landowners who meet the basic eligibility requirements of a local program can host FCA mitigation, as long as they agree to permanently protect and maintain the project. Most counties also require a minimum bank size threshold, with the most common minimum size being one acre (about 0.40 hectare). Landowners must submit an application and a forest planting plan to the local agency for approval. Any land that is not forested at the time of application is legally eligible for a forest mitigation bank. After review and approval, landowners can participate in the exchange process of payment for credits. They may be asked to post a two-year bond to guarantee the planting, and to place the planting site in a permanent conservation easement.

The sale of the credits is a purely private transaction between the supplier of the compensation measures and the project developer which is obliged to meet FCA compliance. In most counties, one forest mitigation credit is valid for one acre of forest. But this can also be subdivided if, for example, an investor

only has to offset half an acre. The price of a forest mitigation credit depends on the demand generated by private and commercial projects in relation to the existing range of credits held by landowners. The price is also affected by the conditions under which the respective county's Fee In Lieu functions as a 'last resort' form of offsetting. The amount of the fee is considered an indicator of the monetary value of a forest area in each county. Creation bank credits, namely those issued for the establishment of new forests, are more expensive than retention bank credits which aim to protect existing forested land over the long term. In 2008, one county estimated that credits from creation banks were fetching up to \$ 20,000 per acre and retention banks credits up to \$ 8,000 per acre. The different ecological as well as economic values of the credits of retention banks are nevertheless taken into account: For example, if a project developer wishes to offset an acre of cleared forest in Howard County, they are required to obtain retention bank credits for two acres, while credits from the creation banks are valued at a ratio of one to one.

Landowners are required to keep a record of all transactions and submit that record to their local jurisdiction each year. The local jurisdiction also keeps a record of the transactions through the receipt of the 'credit transfer' forms, and is supposed to periodically visit the property to ensure that the credited actions are still in place. FCA planting can be managed to produce fiber or fuel for other markets as long as the forest is maintained as a functional forest. Private landowners can work on their own behalf or with a broker that helps them to develop a bank while also collaborating with the implementing agency to certify the credits. One of the most innovative and popular 'brokers' in this sense is a web

Forest Mitigation Banking in Maryland

Region (area):

Twelve counties and several municipalities in the Chesapeake Bay area, Maryland, USA (about 275,200 ha affected area)

Starting year (stage):

1993 (ongoing)

Objective:

Provision of multiple ecosystem services and biodiversity

Beneficiary:

General public represented by developers which are required to compensate for the loss of trees

Service provider:

Landowners

(Other) Intermediaries:

Maryland Department of Natural Resources, local authorities, the Pinchot Institute for Conservation with the Bay Bank as well as other external facilitators

Payment arrangement:

Input-based; the level of payment is based on production costs, supply and demand, and is influenced by the local government regulations

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<http://www.dnr.state.md.us/forests/programapps/newFCA.asp>

The Chesapeake Bay is the largest estuary in the US with a length of approximately 300 km. It lies off the Atlantic Ocean between Maryland and Virginia. The Chesapeake Bay watershed encompasses nearly 170,000 km² over six states and the District of Columbia. Runoffs from urban areas and farms as well as deforestation and pollution have led to water quality problems.

platform developed by the environmental organization Pinchot Institute for Conservation called Bay Bank (see information and interview below).

It should be pointed out, however, that Forest Mitigation Banking as a method of offsetting has not been considered successful in every county. The rules associated with forest mitigation banks in many counties are more restrictive than the Fee In Lieu option, or the costs for establishing a bank are simply too high. Some counties have indicated that it is difficult for them to convince landowners of the financial benefits of a forest mitigation bank given the restrictions placed on their property. Other counties comment that bank development is very expensive due to the additional staff required to verify, certify and follow-up on the credits available and sold. **Carroll County, however, is one successful example of how the Forest Mitigation Program has been implemented: The county's FCA regulations reject the Fee In Lieu option entirely, and support the development of private forest mitigation banks. Since the mid-1990s, about 62 percent (161 hectares) of cleared land requiring offsetting measures in Carroll County has been reforested with the help of mitigation banks.** According to FCA reports, forest bank credits have been transacted for 2,057 hectares throughout the whole of Maryland since the introduction of the banking option.

Bay Bank – Chesapeake Marketplace (www.thebaybank.org)

The website was developed by the Pinchot Institute for Conservation, a nonprofit environmental organization. The stated aim of the NGO is to strengthen ideas and strategy to protect forest areas by developing practical and widely supported solutions that address the challenges of nature conservation. The aim of the Bay Bank is to inform landowners about the various sources of financial support and to connect them with markets for ecosystem services, and, in so doing, bring them into contact with traditional conservation programs as well as potential buyers of forest mitigation credits. The Bay Bank sees itself as an innovative, market-based solution to maintain and improve the environment. As a centralized brokerage platform, it seeks to mediate between buyers and sellers. The site provides a variety of tools and services for landowners, service providers and buyers interested in mitigation banking or voluntary markets for ecosystem services. These tools include:



→ **LandServer:** This free web-based tool identifies valuable ecosystem services offered by a certain parcel of land. Subsequently, it evaluates the property's potential to receive funding from governmental agri-environmental programs like the Conservation Reserve Enhancement Program or other payments for enhancing the identified ecosystem services. It generates a detailed report by analyzing an extensive database of geographic, ecological, physical and other data sets related to land composition, namely (erodible) soils, distance from water bodies, species range, nutrient loading hotspots and other factors. Finally, it provides information on how to get started. In this way it helps landowners assess the chances and opportunities of receiving payments for the natural resources and ecosystem services provided by farmland and forests.

→ **Bay Bank Conservation Marketplace:** Here, landowners can post ecosystem services credits generated on their property and/or an 'expression of interest'. Bay Bank has established trading protocols that must be followed to generate forest mitigation credits for transaction through the marketplace. Those protocols are compliant with existing regulatory and voluntary markets. Potential buyers can search for potential and existing credits in different market areas (like forest or wetland conservation, carbon sequestration or water quality protection) and states. Once buyers find a project or the credits they require, they can email the landowner directly to begin the negotiation to purchase the credits.

→ **Bay Bank Registry:** Credits are tracked in a multi-market- and multi-state registry to ensure that only credits developed according to Bay Bank protocols or other approved protocols are issued, and that individual credits are not being sold multiple times. By providing this transparency, the registry also helps in

the development of 'bundled' credits, i.e. multiple credits from a single conservation action.

Bay Bank started with its first pilot projects in Maryland and Delaware in 2010. A project expansion to the rest of the Chesapeake states is planned along with an increased focus on the tools that support outreach and education. To ease landowner adoption, the tools will be incorporated into the 'Forest for the Bay' program, a free, voluntary program to promote sound forest management practices that was developed via a collaboration between regional nonprofits like the Alliance for the Chesapeake Bay and federal as well as state institutions.



*Interview with Eric Sprague,
Program Director at the Pinchot Institute for Conservation at the time
of the interview; he is now Director of Chesapeake Forest Programs,
Alliance for the Chesapeake Bay*



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What made you think of developing a new PES or specifically the BayBank and LandServer?

It all started with this landowner problem in the Chesapeake Bay watershed where we worked. How do we engage landowners to improve water quality? There are over a million farmers and forest landowners in the Chesapeake, and it is hard to meet them all. So we thought, here is a niche to really figure out whether tools can better streamline landowners into this program. LandServer is the first part to let them know what's possible. And at the Bay Bank marketplace, they can figure out what specifically water quality trading does for them: How much money could I make? How much would it cost me? And then another platform that we built at Willamette promised to help project developers implement these projects. So it's all going to be based on how you can make this easier. How can we help facilitate existing programs for the most part?

You said LandServer was developed to let landowners know what's possible. Could you please tell us a bit more about what kind of modeling tool it is?

The LandServer is meant to be useful to landowners, and it's meant for landowners to use themselves, to give them an idea as to what the possibilities are. It's also to encourage them to take the next step and figure out who to talk to in the first place.

So I wouldn't call it a model, but a screen, an eligibility screen with some very basic models in it. It includes multiple layers of data sets on watersheds, soil types and priority areas with different agencies. It's based on the size of the property, the land cover mix, where they are in a broader location, whether they're in a priority area or not, how close they are to the stream... that's where it filters them for different programs on what they could be eligible for.

For example, we are working with the Maryland Forest Service. The Forest Service helps prepare forest management plans for landowners. Landowners want a forest management plan to get tax breaks, etc. The Forest Service is encouraging new landowners to use LandServer first. So then when you do talk, you have a better sense of what is on your property, what your objectives might be, and hopefully that saves both the landowner and the service forester time and money. So, we hope it can be helpful with those things.

Do you think modeling approaches or tools can be useful in the design of PES?

I do, especially for implementation. It is very helpful, for example, if you have a facility or a waste-water treatment plant: They have this responsibility for a certain number of nitrogen pounds per year, and a farmer plants trees to provide that benefit. In this case, modeling can be very important to convert the landowner's practice into a unit that the permittee needs. There are so many factors on soils, hydrology, etc. that they have to take into consideration. Here, I think modeling is going to be absolutely needed.

It probably also makes sense to have this when you're starting a program to build the ground rules everyone agrees upon. Or when you're talking to landowners about limitations, options and what they could do. And modeling can be valuable in design to figure out which activities are going to be the most effective, cost effective and ecologically effective. It gets so complex so quickly. So I think tools are really important.

But there is that fine line between complexity and practicality with the modeling. It can get expensive and difficult, particularly if you bring in stakeholders, for example, when you look at water quality as we do here right now in Chesapeake Bay: Here, direct measurements are going to be awfully costly. So modeling is going to be important. We used a modeling approach to track water quality and improvements in the Chesapeake Bay. But many of the farmers and other groups question the science that is going on and are suing over that. So there is a challenge with that. I think the lesson in the Chesapeake is just that all stakeholders need to be involved in that model development earlier on, and spend the extra time to get it right. And hopefully that will help later on with questions, lawsuits etc.



100 Äcker für die

The goal of the project, initiated by scientists, landscape conservationists and a nature protection foundation, is to establish a national network of conservation fields for wild arable plant species. Funds for financing land purchases and for paying farmers tending the land are acquired through a regionally specific mix of payments for compensation measures, agri-environmental programs, and state and foundation resources.

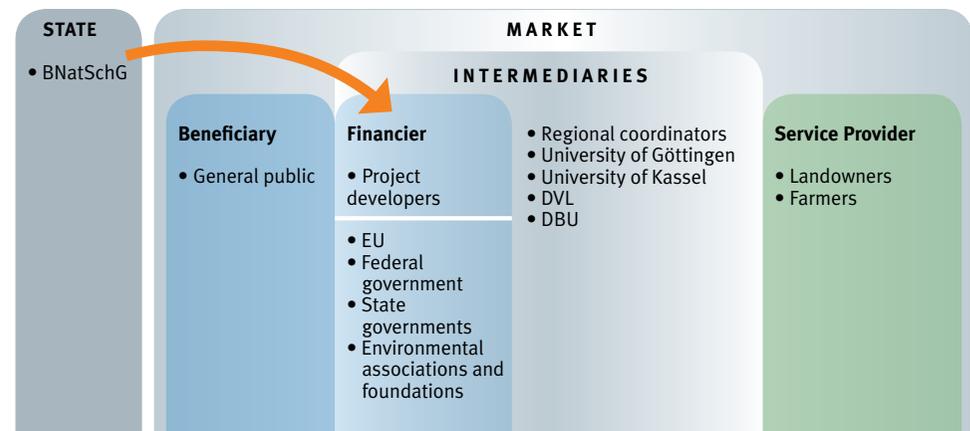


The botanical biodiversity of the German landscape has come about over the centuries almost as a by-product of traditional extensive farming. The majority of wild arable plant species across Germany, such as cornflower, red poppy, corn cockle and adonis, first came to Central Europe with cereal crops. These mostly annual species have adapted their habitat requirements and lifestyles to those of crop species, with their survival reliant on yearly cultivation. The increasing intensification of agriculture combined with the growing use of chemical herbicides and fertilizers has led, especially in recent decades, to a massive loss of botanical biodiversity across the fields of Germany. Today, several wild arable plant species are threatened with extinction along with many animal species that rely on these plants as a food source.

Specific management of the fields is required to preserve the increasingly rare species of wild arable plants. For over 40 years, efforts have been made and partnerships formed with farmers to preserve these species.

Past and present activities in this area have mostly been limited to individual initiatives, and an exchange of experience as such has rarely occurred. Changes in funding conditions, increased grain prices and the heavy administrative burden associated with many agri-environmental programs designed to protect wild arable plant species on cropland has led farmers to distance themselves from the projects. Consequently, many of the projects fail after some initial success due to long-term management cost. The initiators of 100 Äcker für die Vielfalt (100 fields for biodiversity) started the project in 2007 with this situation in mind, seeing it as time to bring renewed rigor into the protection of the wild arable plants in Germany. Scientists at the Universities of Göttingen and Kassel, representatives of the Deutsche Verband für Landschaftspflege e.V. (DVL, German Association for Landcare), and the Deutsche Bundesstiftung Umwelt (DBU, German federal foundation for the environment) initiated the project designed to develop long-term financing and implementation concepts for the protection of wild arable plant species.

The central idea and stated aim of the project is to establish a nationwide conservation field network of wild arable plant species. The valuable flora presently growing on representative sites should be secured and cultivated in line with specific



Vielfalt

nature conservation objectives applicable to those conservation fields. **If possible, one such conservation field containing the regionally site-specific communities of wild arable plants should be located in each natural area within Germany, at least 100 fields in total until the end of the first implementation phase.** The initiators hope that in the future these fields will act as both a starting point for the repopulation of endangered species and the focus of further scientific investigations.

The Georg-August-University of Göttingen together with the Witzenhausen Research Institute of Organic Agriculture and the DVL conducted an 18-month feasibility study prior to the implementation phase. The research carried out on-site during this period led to the identification of the most appropriate sites for conservation fields as well as the participants who could likely implement the required measures. A quantitative analysis served to determine the current inventory of endangered wild arable plant species in Germany. For this purpose, conservation agencies and associations, environmental groups and other relevant organizations involved in the protection of wild arable plants were interviewed. It was also a part of the preliminary study to develop concepts and strategies that could ensure the long-term financing and management of the conservation fields. The implementation phase of the project was finally launched at the beginning of 2009. It was during this stage that the sites of high botanical significance were chosen, their management optimized in line with nature conservation objectives, and farmers motivated to actively support the project.

The project managers define a conservation field as an area that contains an exceptional inventory of plant species to be protected or fostered over the long term using contractual agreements or legal measures. Four criteria are used during

the selection process for a field: (i) The field should have high botanical significance, i.e. it should preferably show site-typical wild arable plant species; (ii) the area should have at least 10 years or at best open-ended conservation available for the wild plants; (iii) the continuous management by a farmer and the finances required to implement the measures need to be available; (iv) there is a regional organization (landcare association, environmental association, Flächenagentur etc.) or person available to ensure on-site support for the farmers and to monitor the project until it has ended. The conservation sites are seasonally flooded wetland fields, nutrient-poor and acidic sandy fields, or stony and flat chalk fields. Often they are the property of environmental groups, Flächenagenturen or local agencies, or they have been acquired specifically for the long-term goal of protecting wild arable plant species through contractual arrangements or legal measures, like easement agreements entered in the register of deeds reserving the fields for nature conservation use. The participating farmers lease the land and are free to decide what to plant depending on their business concept and the kind of species-specific management required. For the majority of the fields the term secured for conservation runs for between 15 and 30 years, and in some cases is open ended.

Yield losses caused by the management of the wild arable plants are paid for, as too are the added costs involved in adapting management styles. Funding for this is primarily generated through the Eingriffs-Ausgleichsregelung (impact mitigation regulation) that requires project developers to mitigate or compensate for any impact on nature and landscape. Specifically the instrument of the so-called Produktionsinte-



100 Äcker für die Vielfalt

Region (area):

Various areas throughout Germany (currently 112 fields, about 475 ha)

Starting year (stage):

2007 preliminary study, 2009-2014 first implementation phase (temporarily terminated)

Objective:

Protection and enhancement of biodiversity

Beneficiary:

General public represented by developers legally obliged to compensate for impacting on nature and landscapes as well as the European Union (EU) in the context of agri-environmental programs, the federal and state governments of Germany, rural associations, environmental associations and foundations

Service provider:

Landowners (rural associations, Flächenagenturen, environmental organizations, foundations, municipalities, private individuals) and farmers

(Other) Intermediaries:

Regional coordinators, Georg-August-University of Göttingen, University of Kassel, and the Deutsche Verband für Landschaftspflege e.V. (DVL, German Association for Landcare) supported by the Deutsche Bundesstiftung Umwelt (DBU)

Budget:

€ 1.2 million in total for the project development and coordination, plus € 200,000 for the preliminary study

Payment arrangement:

Input-based, level of payment made to landowners is negotiated individually, level of payment made to farmers based on opportunity and production costs

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grierte Kompensationsmaßnahmen (PIK, production-integrated compensation measures) is used by which compensation measures are implemented on agricultural production areas. However, another part of the funding comes from agri-environmental programs, from land conservation funds for the purchase and management of land, from foundations or from environmental associations. The project coordination and implementation is funded by grants from the DBU as well as the implementing organization's own resources. The DVL primarily coordinates the practical implementation of field protection and public relations for the project. The universities of Göttingen and Kassel are responsible for the project management and the scientific monitoring of the project. **Four regional coordinators are engaged at the interface between conservation and agriculture. These individuals maintain personal contact with the participating farmers, landcare associations, land companies, Flächenagenturen (land agencies), planning offices and local nature conservation agencies. They monitor the practical establishment of the conservation fields and are both the initiators and the farmers' advisers.** A monitoring concept for the development of vegetation on the conservation sites has been developed to ensure ongoing success after the implementation phase has come to an end.

Annual conferences on the subject were held at both national and international level at different locations in Germany. There experts from research institutions, environmental organizations, agricultural administrations and foundations exchanged opinions and introduced pilot projects, discussed management practices as well as new cooperative projects. According to the project management, most problems were encountered when attempting to acquire funds to purchase suitable areas for nature conser-

vation, along with ensuring their long-term financial security. In particular, when a field was acquired using PIK, lengthy negotiations were often required, sometimes running over several years. Nevertheless, until the time shortly before the project ended, a total of 112 conservation fields were secured, involving about 475 hectares of land. Promising negotiations are currently being held about continuing the project under different trusteeship.



Orange lilies, poppies and Adonis vernalis used to be the typical splashes of colour in the grain field. Today they are only found on extensively cultivated fields that are farmed without herbicides.



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*Interview with Dr. Stefan Meyer,
Georg-August-University of Göttingen, Project manager and regional
coordinator of the 100 Äcker für die Vielfalt project*



How was the project conceptually developed? What considerations and steps were important?

First we looked at the status quo regarding the protection of wild arable plants in Germany to see what made projects successful and where otherwise promising initiatives failed. Here we carried out a SWOT analysis. Another key point from the beginning was that we performed a search for farmland areas with valuable plant species, and that we introduced ourselves in the respective German states. Initially at the ministries, since for us they were key contacts and we reasoned that they definitely needed to be on side early. And of course we soon had the agricultural representatives on board. These were actually the main steps in the first year of the project.

What were the main challenges in implementing the project?

Really just securing the land, because at the moment there is an incredible amount of competition for land. Our field sizes range from between 0.2 and 10 hectares, which is actually a negligible amount when you compare that to the daily loss of approximately 70 ha of agricultural land that occurs because of settlement and traffic zoning. But even then you still have difficulty with this arable piece of land since different interest groups often lay claim to it. And another point is the financing of the management measures, of course, especially in the context of PIK. In the beginning many stakeholders were skeptical.

Some would have preferred to rely on tried and tested approaches rather than engaging in new ways of protecting wild arable plants. This was often influenced by the staffing situation at the relevant conserva-

tion agency. And this varied greatly from region to region. We achieved more in regions that were relatively well equipped and staffed and where there was an interest in the subject of wild arable plants conservation. A third difficulty was the project time frame. We could only secure the majority of our fields at the end of the project, principally because the PIK instrument needs a very, very long lead time. It often takes two to three and a half years and sometimes longer. We are only harvesting the work of the past few years now at the end of the project.

Were there any conflicts with farmers, and if so, how did you resolve them?

In some cases there were very adamant farmers who were very skeptical about doing business without herbicides and synthetic fertilizers. On the other hand, some environmental groups pursued some very anthroposophical goals, and if everyone then insists on having it their way, then one naturally tries to mediate to reduce conflict and sometimes simply to remind people that everyone is aiming for the same goal. So here efforts were made to bring all the stakeholders to the table right from the start, even if sometimes that's very difficult to do. In the beginning, of course, there are always reservations about the feasibility of such a Germany-wide project. Regional structures need to be put into place. We work with regional coordinators who operate at the interface between agriculture and conservation and know what's going on at ground level at the site. In

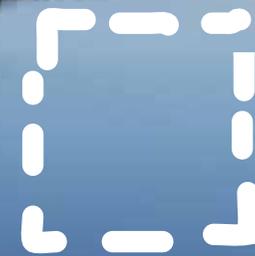
our opinion it's also extremely important to speak the regional dialect, for example. Therefore, in every project that focused on specific regions, I would always push to establish regional coordination and a regional structure. This approach increases the success of the project and it also gets you into contact with the farmers more quickly. So even if we are a Germany-wide project, regionality is a very, very important factor! And an important aspect here is that you need to publish results not just in academic English-language articles, but also in national newspapers and nature conservation magazines or agricultural journals. And that you have confidence in the work that the farmer does. This is also required. Always together with the farmer – never against the farmer!



Field larkspur. It shines forth in brilliant dark blue from May to September from the edges of the grain fields.



Practice. Taking stock.
What are the challenges
and how can they be
addressed?



Practice – Taking stock

In our introductory chapter we already discussed the major challenges relating to the development and implementation of PES. What we have to do now is summarize once more the way these challenges are tackled in our examples. To do this, we examine the featured projects and programs from three perspectives: First, we look at the players themselves. Who are the buyers and suppliers in each PES? Who are the initiators, who the intermediaries and what are their motives? Once again, we use the three relevant types of PES to structure these observations. Then we discuss how the actual payment was arranged in the successful examples, that is, how the transfer of service and money is organized. Regardless of type, the initiators of all PES faced similar challenges here, for example when it came to defining targets or determining the amount of payment or the terms of the contracts. And finally we pursue the question of what ‘soft’ factors might have been crucial in the successful examples over and above the successful negotiation of the contracts.



Players and motive

Voluntary non-governmental payments

Our examples support the results of other studies: Classic user-financed PES are rare in practice. In most cases, practically nobody can be excluded from the benefits of ecosystem services or biodiversity, or if so it would involve very high costs. Owing to this non-excludability, no classic demand arises for most ecosystem services and biodiversity. Hence it is not surprising that PES were developed for the marketable goods ‘drinking water’ and ‘recreation’ in the *Edwards Aquifer Protection Program*, *Upstream Thinking with Westcountry Rivers Trust* and the *Westcountry Angling Passport*, the examples that come closest to the ideal type of user-financed PES.

In the drinking water examples the development of the PES was initiated by the demand side, although there were different stakeholders behind it and the motives differed: In the case of the *Edwards Aquifer Protection Program* a governmental, municipal player developed a PES in order to provide the population with sufficient and clean drinking water on the one hand and to stabilize the groundwater levels on the other. In addition, negative impacts on the groundwater dependent habitats of rare species were to be averted. Both as users of the drinking water and as the source of negative impacts on groundwater quality and quantity, the population was and is ready to pay for appropriate measures. In the case of *Upstream Thinking* it is a water company that actively motivated and supported the development of a PES as a commercial stakeholder.

In both cases the initiative was not propelled solely by their own self-interest in clean drinking water, legal requirements also played a role. Both the town and the companies had to expect a tightening of the legal requirements in the medium term – be it in the form of legal requirements to comply with

the water quality standards (*Upstream Thinking*) or to limit the amount of water used (*Edwards Aquifer Protection Program*). The drinking water providers act not only out of their commercial interest in obtaining good, cheap drinking water, but also in order to meet legal standards and to avoid additional constraints. In the case of *Upstream Thinking* economically motivated demand met with an intermediary who wants to improve the environmental situation in the interests of society and/or for the sake of nature itself and who acts as a supplier. And in the *Edwards Aquifer Protection Program* as well, civil society players act as intermediaries guided by the intrinsic motivation of wanting to do something for the environment. In both drinking water examples, the (economic) self-interest of the buyers encounters primarily intrinsically motivated intermediaries representing the supply side.

In contrast to those first two examples, in the case of the *Westcountry Angling Passport*, the initiative for the PES came from the supply side and not from the demand side. A civil society stakeholder made targeted use of the PES approach to achieve its environmental goals and developed a PES not out of self-interest or commercial interest but in order to improve the environmental situation. We have exactly the same starting point with the *MoorFutures*[®] and *Trinkwasserwald*[®] examples. Here, however, it is not the direct beneficiaries of the service who pay but the party causing the overuse or damage to ecosystem services and biodiversity, to compensate for their negative impact. The motivation of the players on the buyer side is varied and seems to be essentially a mixture of social responsibility and economic self-interest, based on the hope that a green image will help them get more customers.

These examples also show that initiative intermediaries

User-financed PES are rare, and there are only a few cases of the initiative for a PES coming from the direct or indirect beneficiaries.

It is primarily the supplier side that does the initiating. It is determined by intermediaries, who are not driven primarily by self-interest, but who want to preserve nature for society and for its own sake.

may have quite different motives and interests in detail. In the case of *Trinkwasserwald*® we have a private association set up explicitly for this purpose. Here, dedicated players had a clever idea about how they could finance nature conservation privately. Although there were no profit motives behind the founding of the association, entrepreneurial thinking is evident, not least because the funding of their own posts is connected with the association and the idea. In *MoorFutures*® it is players who specifically had their eyes on peatland protection and wanted to develop new approaches to that. The fact that players from the fields of research and government administration had come together here was certainly an advantage. They brought with them the expertise needed to develop carbon certification standards for the restoration of peatland and had at the same time the capacity and reputation to bring the stakeholders together. Above all, highly motivated individuals with the necessary expertise and the will to develop something new were crucial for success in both cases.

Blühendes Steinburg is an example where the financing is ensured by a nonprofit foundation. The object of the foundation was first and foremost, to develop innovative approaches and to test them jointly with farmers. In the long term, the foundation is attempting to make this project a governmental PES, so there are deliberate plans to intermesh with governmental payments. The influence of government on non-governmental PES is even clearer in the case of the two UK examples, *Woodland Carbon Code*, *WCC* for short, and the *Pumlumon Project*. The carbon certification standards were developed in the *WCC* as in *MoorFutures*® by governmental players. Also, in the case of the *WCC*, the government provides funds itself to finance afforestation projects: The mostly private sector project developers use the

WCC methods for calculating the carbon credits in the course of concrete afforestation projects, in order to make those credits available on the voluntary carbon market. In addition, they can still count on governmental funds as well to finance the afforestation projects. Without the assurance that a significant proportion of the afforestation would be financed by governmental funds, the commercially oriented players would probably not risk developing *WCC* projects. Currently the stakeholders consider it very difficult to finance afforestation measures on a purely private sector basis through the sale of credits. There is a dovetailing with governmental payments in the *Pumlumon Project* as well. There payment is made for various measures by which ecosystem services and an added biodiversity value are provided. Governmental and non-governmental payments are combined to achieve the goals set. The PES was initiated and expedited at the regional level by a civil society organization. Interestingly, this organization does not act out of ecological motives alone but would also like to tackle social and economic problems in the region. The initiators see in the PES a new business model for the farmers in the region: The ecosystem services provided by the appropriate land management are considered marketable products and offered to buyers and financiers accordingly.

Voluntary governmental payments

The last two examples of non-governmental payments already transition to governmental PES. In fact there are at times only minor differences to be detected between the examples of these two types – apart from one outstanding exception: In the governmental PES, government acts as a financier and represents the user interests of the general public. But

Governments provide important starting points and conditions for non-governmental PES with their agri-environmental programs and the development of standards.



The transitions between non-governmental and governmental PES are blurred. At the regional level, the two types may complement one another.

Dedicated regional players specifically use governmental agri-environmental schemes to finance their projects.

with regard to this aspect as well, the real-life examples cannot always be clearly distinguished, as we see from the *Edwards Aquifer Protection Program* and the *Niedersächsisches Kooperationsmodell Trinkwasserschutz* in this book: Government acts as a financier in both. The *Edwards Aquifer Protection Program*, however, was considered to be a user-financed PES, since the city serves as the intermediary for specific beneficiaries, namely the inhabitants of the city, and residents regularly legitimize the program by referendum. The city uses its capacity to organize a PES with reasonable transaction costs by increasing tax revenues. In the case of the *Niedersächsisches Kooperationsmodell Trinkwasserschutz*, however, government exercises public authority. It initiated the program and determines the conditions for payments in the context of this PES, e.g. in the form of mandatory water withdrawal fees. As the examples show, the theoretical boundaries cannot always be clearly drawn in practice. Hence a narrow concept of PES purely as non-governmental payments does not seem to us to make much sense.

When we look at the other constellations of players and the objectives as well, we see parallels between non-governmental and governmental payments. In both the *Naturschutzgerechte Bewirtschaftung von Grünland in der nordrhein-westfälischen Eifel* program and the *Pumlumon Project*, different stakeholders work together with farmers and develop payment mechanisms to guarantee sustainable grazing in their region and thus ensure biodiversity and landscape diversity. In the first case, only appropriate governmental programs are used to achieve the objectives, while in the second case non-governmental and governmental resources are used in combination.

In the examples of successful governmental PES, it is striking how often governmental (agri-environmental) programs

are utilized by dedicated stakeholders at the local and regional levels. These stakeholders develop concrete projects and implement them in cooperation with other players, involving the actual service providers in the process from the outset. This applies to the *Gemeinschaftlicher Wiesenvogelschutz* PES as well as to the *Grünland in der Eifel* program. Seen in that light, it is not the specific governmental program (PES) that is successful, but a regional or local project that utilizes that governmental program. The main initiative in these examples of successful governmental payments, then, comes not from government but from committed conservationists with roots in the region.

The successful examples of this type, moreover, are instances of public funding of pilot projects. Non-governmental players develop pioneering solutions for the innovative design of PES that can then be implemented together with the relevant stakeholders. These include the *Performance-based Environmental Policies for Agriculture Initiative*, *PEPA* for short, and the *Florida Ranchlands Environmental Services Project*, or *FRESP*. The players in these examples are very dedicated people who have been involved with PES for many years and want to use this approach specifically to resolve environmental problems. After their successful implementation, the pilot projects are then converted into governmental PES. Non-governmental players with a pioneering spirit and good knowledge of governmental funding options function here as PES developers.

The distinguishing feature of the two successful government funded and initiated examples, *Conservation Reserve Enhancement Program in Vermont*, *CREP Vermont* for short, and the *Niedersächsisches Kooperationsmodell Trinkwasserschutz* is that the farmers and landowners are actively approached as service providers. For that purpose, civil society players rooted

in the region are deliberately included, as in *CREP Vermont*, or cooperation is stimulated between the relevant local and regional stakeholders.

All of these considerations clearly show one thing:

In the governmental PES as well, dedicated, highly motivated non-governmental players at the regional and local levels are essential for the success of programs and projects. And committed individuals often play a prominent role.

Mandatory polluter-funded payments

In our research areas, it is only in Germany and the United States that mandatory or regulation-motivated payment approaches result from the current environmental legislation. Some of the PES evaluated as successful belong to this payment category. Who are the stakeholders behind this? In the first stage, the development of the PES was motivated by regulatory legislation. Building on this, however, certain stakeholders on the supply side developed PES such as the *Medford Water Quality Trading Program* and the *Silvergate Mitigation Bank*. For the most part these are initiators who spring into action knowing the legal framework: They know about the obligation to compensate and the possibility companies have to comply with environmental standards by investing in the green rather than the gray infrastructure, and they use this as the starting point to develop restoration measures and measures to improve ecosystem services and biodiversity. They pay in advance in developing the PES because the regulated market gives them a certain degree of security as far as demand is concerned.

The *Medford Water Quality Trading Program* shows how much ecological expertise and commitment it takes under the

given circumstances to develop and implement innovative PES. Here, building on the experience from another PES, not only was an individual ‘green’ solution developed for a concrete enterprise, but all those involved had to be persuaded that the use of ecosystem services was more appropriate and cost-effective than technical solutions. It is not surprising that it is not a commercial stakeholder who steps up to the plate here but a civil society organization, convinced that such approaches can accelerate progress in environmental protection. With the relevant statutory standards, however, it cannot be ruled out that more commercially oriented companies will enter this market, as has already been the case in habitat banking in the United States and in the context of the impact mitigation regulation in Germany.

With that we come to two other examples, the *Silvergate Mitigation Bank* and the *Flächenagentur Brandenburg GmbH*. In these cases, professional providers of compensatory measures were named as successful PES. Behind both examples there are commercial companies that hope to make a profit but also, perhaps even primarily, are highly motivated to improve the state of the environment. This is shown by the history of the two companies, and in the case of the *Flächenagentur Brandenburg* it can be seen from the fact that one of the shareholders, the



The government invests in the development of innovative approaches and uses the experiences of local projects to introduce governmental programs.

Civil society organizations commit themselves to utilizing green instead of gray infrastructure.

Social entrepreneurs act as service providers on the offset market.

NaturSchutzFonds Brandenburg, is a foundation under public law. Both companies can therefore be described as traditional social entrepreneurs that have done pioneering work together with governmental players in developing habitat banks and the so called Flächenpools (land pools). In addition, the managing directors of the two companies are still known throughout the country as dedicated protagonists in this area.

The *Forest Mitigation Banking in Maryland* example also shows how important it is for such an approach to be really wanted and actively promoted by the relevant stakeholders. Because in *Maryland Forest Mitigation Banking* is only successful where it is explicitly promoted by the competent regional agencies, the individual counties. The PES *100 Äcker für die Vielfalt* is an example of a traditional nature conservation project that uses in particular the payments of project developers as one important funding source among others. The success of this PES is due to the great commitment of dedicated scientists and regional implementation. The high degree of motivation of the scientists stems in part from the fact that 'their' object of study is protected.

But what motivation is there on the part of the beneficiaries? Here we have to distinguish between the situation in the *Medford Water Quality Trading Program* example and the motives of the project developers in the *Silvergata Mitigation Bank*, *Forest Mitigation Banking in Maryland*, *Flächenagentur Brandenburg* and *100 Äcker für die Vielfalt* PES, which are required to make compensation payments: In the case of the *Medford Water Quality Trading Program* the water treatment company is indeed the beneficiary of the ecosystem service provided. So here we have an ideal user-financed PES. With the legal requirements in the background and above all due to the difference in cost



between green and gray infrastructure, the company decides voluntarily. As an immediate beneficiary dependent on the ecosystem service, this buyer therefore has a major economic interest in the actual provision of the ecosystem service. In the other cases the situation is different. Here it is quite enough for the paying project developers to comply with the legislation. So they pay for the correspondingly required extent of the compensation measures, but are not really interested in whether the ecosystem services are delivered or the specified biodiversity objectives are actually attained. Were this lack of interest in the actual ecosystem service or the biodiversity objective on the part of the buyer matched by a purely commercial interest on the part of the supplier, there would be cause to doubt the ecological effectiveness of the PES. In any case, the successful development of banks and Flächenpools by solely commercial enterprises poses a major challenge to the legislator. Here government has to have very good control procedures to ensure that the ecosystem services sold are delivered and the biodiversity objectives are achieved.

The beneficiaries of green infrastructure have a considerable economic self-interest in the delivery of ecosystem services or biodiversity.

Habitat Banks and Flächenagenturen acting solely on a commercial basis are a challenge for legislators.



Contract drafting

The initiators of all our PES had to deal with the various issues around the organization and contractual structure of exchanging money for ecosystem services. The following is a compilation of the answers they found.

Definition of targets and their quantification

The first and most crucial point is the definition of the actual service to be paid for in the context of the PES. When we look at our examples, we notice that most of them are focused on one service. In the *Grünland in der Eifel* program, as in *Gemeinschaftlicher Wiesenvogelschutz*, *100 Äcker für die Vielfalt*, *Blühendes Steinburg* and the *Silvergate Mitigation Bank*, the idea is to preserve or promote and create habitats for certain plant and animal species in clearly defined areas. In the examples dealing with water issues, the focus is often on certain aspects of water quality: In the *Niedersächsisches Kooperationsmodell Trinkwasserschutz* example the idea is to reduce the levels of nitrate in the groundwater of regional drinking water protection areas, *CREP Vermont* and *PEPA* want to reduce the phosphorus levels in selected surface waters, the *Medford Water Quality Trading Program* wants to reduce the thermal load on certain rivers, and *FRESP*, in addition to lower phosphorus discharges, is concerned with the amount of water retained in a selected area. The *MoorFutures*[®] and *WCC* PES as well are not just generally geared towards carbon fixation but deal specifically with emission reductions or carbon storage on clearly demarcated peatlands or afforestation sites. In the *Westcountry Angling Passport* as well, what the buyer receives in exchange for his payment is clearly formulated: the joy of fishing and relaxation at locations selected by the buyer himself. As we see, many of our examples endeavor to have a clear target in

terms of both content and location. Many of them determine in advance – some when the ecosystem services or the biodiversity objective is being defined, some when suitable providers are being identified – precisely which areas the PES will apply to. Others, while leaving the choice of the individual areas to the service providers, define the criteria for the selection in detail.

In most of the examples, at the same time as the service to be provided is being clearly defined, an attempt is made to present the service as quantifiable, because if the service is quantifiable it can be measured, directly or indirectly. The best example of this is *Gemeinschaftlicher Wiesenvogelschutz*: The goal is to preserve the meadow bird population on grasslands in a flood plain. To what extent the individual farmer makes his contribution is determined by counting all the nests where eggs are successfully hatched on his land. Other examples, such as *Blühendes Steinburg*, *Upstream Thinking* and *FRESP*, determine the number of species surviving on the land, the water quality in selected waters and the amount of water retained in the wetland by means of spot tests. *PEPA* and the *Medford Water Quality Trading Program* calculate the service provided by means of simulation models. In the case of *Trinkwasserwald*[®], however, values measured in comparable areas are extrapolated. The principle is similar in the case of *WCC*. And in *MoorFutures*[®], scientifically-based indicators are used to determine the actual performance: Conclusions can be drawn about the water level and thus the amount of emissions reduced on the basis of specific plant communities.

Quantification of the agreed service is also what distinguishes PES like *MoorFutures*[®] from traditional donations for nature conservation: The benefits that the paying person or

A clearly defined target in relation to the ecosystem service to be provided and the biodiversity objective is crucial.

Quantified ecosystem services are an essential prerequisite for monitoring and hence for assessing the conditionality. They are also the ultimate basis for output-based payment mechanisms.

institution receives for himself or the relevant end users are clearly defined and verifiable. The payer does not donate € 35 for the purchase of peatland to be restored, he pays € 35 so that exactly one ton of carbon dioxide will be retained in the moor for 50 years and will not get into the atmosphere. The present examples also demonstrate that the distinction between donations or sponsorship and PES is blurred. So it is quite legitimate to discuss to what extent the projects of the *Trinkwasserwald*[®] association can be referred to as PES or whether they are not rather traditional instances of conservation sponsorship. The association itself certainly sees them in that light. The uniform calculation of the additional groundwater recharge regardless of site is worthy of critical discussion. The fact that the association undoubtedly has an interest in near-natural forest conversion comes to bear here. The quantification of groundwater recharge is more an instrument for soliciting donations, however. It works in this case because the buyers are ultimately not the direct beneficiaries of the groundwater. The benefit to the paying company lies rather in the concomitant image enhancement.

Output-based payments

Quantification of the agreed service is not just a crucial aspect for monitoring, it also affects how the payment can be arranged. What exactly are the providers ultimately being paid for – for the implementation of prescribed measures on a specified piece of land or output-based for the quantified service delivered? Linking the payment with the specific quantified service has many advantages: It directs the self-interest of the service provider to the provision of the specific ecosystem service or the biodiversity goal and allows for flexibility in achieving

the goals. It makes clear to the service suppliers just what they should produce. This corresponds more to the self-image of many farmers, who are the service providers in almost all examples, than the implementation of prescribed measures.

The boundaries between input-based and output-based payments are not categorical, however. Numerous transitional forms can be observed. On a scale with a clearly input-based arrangement at one end and a clearly output-based arrangement at the other, many of our examples are more in the mid-field and tending in one direction or the other. Overall, we interpret 10 of our 19 examples as definitely being or tending to be input-based. Conversely, that means that nearly half of the examples are closer to the output-based end of the scale. Here the payments are linked to the outcome, for example to the number of species that ultimately can be found on the area or to the amount of carbon that has been stored. This is noteworthy, since on the whole output-based payments have rarely been found in practice so far. The precise measurement of outputs in the *Gemeinschaftlicher Wiesenvogelschutz*, however, has not been duplicated in any of the other examples. The main reason for this is the complexity of ecological systems. In some of the examples, indicators or models are used to assess the outcome. Nevertheless, payment is based on the output in these cases and not on the measures implemented.

The German *Gemeinschaftlicher Wiesenvogelschutz* and *Blühendes Steinburg* PES are very good examples of how output-based payments can be arranged: In both, the service is so defined that it is countable, and can be measured directly for the total area or for a sample. There is a clear correlation between the management measures of the service provider and the result in both cases. Service providers can thus consciously

The clear definition of the ecosystem service or the biodiversity target is what distinguishes a PES from a donation. In practice, the distinctions are blurred.

In our examples an output-based payment approach is seen relatively often. It is plain to see what opportunities exist and what difficulties are encountered in the process of implementation.

exert an influence, and they themselves decide in both instances whether to take part in the PES and with what measures. Both examples show that such payments improve acceptance among farmers, and the motivation of the service providers and their willingness to cooperate are high. The limits and difficulties encountered in implementing output based payments are discernible, however. They include, among other things, the question of how to deal with external and hence uncontrollable influences on the outcome. If they are known but cannot be prevented, they have to be monitored and taken into account when drafting the contract. In *Gemeinschaftlicher Wiesenvogelschutz* the most important external influences take the form of predatory foxes and martens. Here it is easy to prove that the farmer is not responsible for the loss of eggs. If such an eventuality occurs, the governmental financier bears the financial risk and pays despite non-delivery of the service. In other cases, the external influences can be much more difficult to identify and measure. This is shown, for example, by *FRESP*: If the provision of the service depends not just on one's own actions but also on other factors beyond one's control, the implementation of output-based payments is significantly more difficult. In the case of *FRESP* the problem had to do with the annual amount of precipitation exerting a major, uncontrollable influence on the amount of water retained. It was for this retention that the service providers were to receive output-based payment, however. If output and payment were directly linked, the large fluctuations in payments would have led to dissatisfaction on the part of the service providers and may well have reduced their acceptance of and participation in the PES. The unforeseeable amount of the payment was problematic for the governmental financier as well, because it is hard to take such

fluctuations into account for financial planning purposes. The solution proposed for *FRESP* involved the development of a model by means of which output could be calculated on the basis of the average rainfall.

Use of models

Models play an important role in various successful examples when it comes to measuring the services provided and the corresponding payment to the service providers. These include *PEPA* and the *Medford Water Quality Trading Program* as well as the German *MoorFutures*[®] example in addition to *FRESP*. Models and computational tools are used there to calculate output. The array of tools used is quite large: *PEPA*, for example, uses the state phosphorus index, a fairly simple table in Excel format, to calculate the phosphorus discharge in the area. The index was not designed specifically for the *PEPA* initiative, but it is known to the service providers from their agricultural practice and they can use it themselves. The model used in the *Medford Water Quality Trading Program* is a long-standing science-based approach that has been tested over a number of years and is recognized by government agencies. The model, based on the Excel computer program, uses GIS indicators and different field data. Using that model it is possible to represent the current solar radiation on a body of water and calculate how much that radiation and the associated warming can be mitigated by shading the water. Thus it is possible to model for a specific period of time how many kilocalories of heat from sunlight reach the waters every day, depending on whether the bank is planted or not and with what kind of vegetation. The *Medford Water Quality Trading Program* uses the model to calculate the future shading effect of riparian

vegetation. This is used for calculating the credits sold on the one hand, and on the other hand for selecting the surfaces that are to be planted and calculating the expected cost of this restoration. The GESTmodel used in *MoorFutures*[®] is a science-based ecological model. Specific plant communities which in turn are related to the water level are used to calculate the amount of emissions emanating from an area of peatland. First the actual emissions prior to the project are determined with the aid of the model. Then the development of the areas and their future emissions within the project period of 50 years are predicted. As in the *Medford Water Quality Trading Program* the certificates are then calculated on the basis of the difference between the current and target states.

Models are used in all these examples, because direct measurement would be too complex or even impossible. Models are therefore essential for calculating credits as in the *Medford Water Quality Trading Program* and *MoorFutures*[®]. At the same time, in many cases models are used to estimate where what measures would be most appropriate ecologically and economically. This aspect is also in the foreground in the Landserver model, developed in the Bay Bank context for *Forest Mitigation Banking in Maryland*. Using the free web-based program, landowners can determine what ecosystem services are provided by their properties. On the basis of information about the geographical location, various ecological data and information on funding opportunities, the user learns what his chances are of being paid for those services and whom to apply to for payment. The examples, and especially the interviews with PES managers, also provide information about the risks associated with models: Models can soon become too complex and too large and thus fail to attain one of their objectives, the reduc-

tion of complexity. **The chance to simplify and visualize complex interrelationships is thus offset by the risk that models can instead impede and complicate the process of developing a PES. In this context, it is also mentioned that the stakeholders concerned must be involved in the development of such an instrument so later they will trust the model and accept it.**

Amount of payment

A further essential aspect of contract drafting is the amount of payment: How much must the service provider be paid to get the desired output? In our first chapter, we established that the payments that flow in the context of PES need not reflect the economic and social value of the ecosystem services or biodiversity concerned. Our examples show that the value of an ecosystem service and biodiversity in most cases has little or no impact on the amount of payment. Instead, the opportunity cost and production cost to service providers are especially crucial: Many of our examples, for instance the *Grünland in der Eifel* program, *CREP Vermont*, *Gemeinschaftlicher Wiesenvogelschutz*, *FRESP*, and *Niedersächsisches Kooperationsmodell Trinkwasserschutz*, compensate the farmer or landowner for decreased or foregone revenues. Payment is thus detached from the actual value of ecosystem services and biodiversity. It is instead based on the market price of traditional agricultural products which are produced in reduced amounts or not at all due to the provision of ecosystem services or biodiversity. In many examples, the payment amount also depends on the cost actually incurred for the provision of the agreed service, that is, the production cost, which will be used for pricing, mostly in combination with the



The value of ecosystem services or biodiversity seldom plays a role in determining the payment amount. Mostly it is the opportunity and production cost that are crucial.

Financial incentives exceeding the offsetting of opportunity cost are explicitly excluded in some governmental PES, and are rare in other cases as well. In some cases, the payments are even lower than the costs. Nevertheless, the farmers take part.

opportunity cost. What is striking is that the relevant amounts have rarely been determined individually. Often they make no reference to the individual losses or the expenditure of the individual farmer to provide the service but are set for all service providers per hectare of the affected area. In some cases, such as the *Grünland in der Eifel* program and the *Edwards Aquifer Protection Program*, there are additional benefits for the service providers, such as decreased leasehold interest or tax benefits.

Certainly, it would help advance PES further if attempts were made to determine the monetary value of an ecosystem service and biodiversity, especially so that certain stakeholders could be made more aware of the enormous significance of that service. This could also be a basis for the justification of other incentives, that is, profits, for farmers in addition to the production and opportunity costs. This would offer more leeway for reaching out to the relevant areas or farmers. In addition, a better idea of the monetary value of an ecosystem service can help when it comes to deciding whether it is worthwhile to establish a PES despite high transaction costs. But the monetary valuation of ecosystem services is not absolutely necessary for the development of PES in itself. To summarize: **In our examples, the amount of the payments has little to do with the value of the ecosystem service or biodiversity. This is remarkable against the background of the discussion about PES. Often, when we think of PES it is precisely the monetization of ecosystem services and biodiversity that we associate with them.**

It would be interesting to know why the providers still deliver the service although as a rule only their opportunity and production costs are covered. At the same time they often have to commit themselves for the long term, so they have less flexibility in responding to changes in the market and may even be taking

on a financial risk as a consequence. In several of the examples, one of the implementation problems mentioned was the intensified competition for land associated in particular with such economically attractive management methods as the cultivation of energy crops. Against this background, it is surprising that there are only a few examples where the payments are considered financially attractive for service providers. In the governmental *Niedersächsisches Kooperationsmodell Trinkwasserschutz* example the incentive effect is even explicitly ruled out. In *Gemeinschaftlicher Wiesenvogelschutz* the payments are presumed in some cases to not even cover the opportunity and production costs. Particularly when the goal of PES is biodiversity and the preservation of cultural landscapes, these examples indicate that the farmers and landowners have other motives than just economic ones. When interviewed, the managers of the *Blühendes Steinburg* and *Gemeinschaftlicher Wiesenvogelschutz* PES said that even before, without any PES, the farmers had taken care not to harm the birds and to preserve the grassland species. So there is an intrinsic motivation on the part of the farmers to protect the species. They do not do it just for the money, and so they accept payment amounts that may not always cover the opportunity and production costs.

Additionality

The question of additionality, repeatedly formulated in the literature as an important requirement of PES, can be discussed in this context: Will more meadow breeders be protected, more grassland species be preserved in the end due to the payment than without the PES? It is of course not easy to give a straight answer to this question, especially since the PES have steadily expanded and gained more and more participants. On the

It is not easy to judge additionality. The alternative use options are difficult to assess as a reference and they are quick to change in response to market developments.

whole, biodiversity will no doubt have been enhanced somewhat. Conversely, however, one has to wonder whether in these cases additionality really can and should serve as a criterion.

The additionality requirement has the effect that proactive environmental behavior is not encouraged, because in that case the service is provided even without payment. If the service is now excluded from remuneration, those who display environmentally harmful behavior are ultimately rewarded. The important group of those who opt for environmentally sound management out of conviction, however, is punished. This is because the logic behind a PES payment that demands strict additionality is economic. This economic logic rules out altruistic behavior and is predicated on people being uncooperative and guided by self-interest. **The discussion about additionality on the one hand and the importance of intrinsically motivated service providers on the other makes it clear that PES are not just about financial remuneration for the services of farmers and landowners but above all about recognition and appreciation of their activities.**

Use of market mechanisms

If the amount of the payment is clearly dependent on the opportunity and production costs, there is another challenge in terms of cost efficiency: to pinpoint those costs as precisely as possible in the course of the development of the PES for all potential service providers. The starting point can differ from farmer to farmer for the same measure. While one farmer would normally make intense use of a grassland area, another might plan to let the relevant area lie fallow. The opportunity cost would be crucial for the first, the production cost for the second.

The *NE-PES* governmental program that emerged from

FRESP in the United States and the *Blühendes Steinburg* pilot project in Germany show how this type of challenge can be tackled: They use a tendering procedure, also described in the literature as a reverse auction. Here it is not many buyers responding to one offer (object), but many suppliers responding to one demand. Potential suppliers are called upon to specify at what price and, where appropriate, by what means they can provide the circumscribed ecosystem service. Crucial for choosing among the bids is not just whether the bidder can really deliver the desired benefit but, above all, whether he can do so more cheaply than his competitors. In this way the buyer or financier obtains valuable information about how high the bidder's opportunity and production costs are. This allows him in turn to distribute a limited budget cost-effectively among as many suppliers as possible. But the identification of the most cost effective service providers and thus the efficient distribution of financial resources is only one of the goals when such procedures are used. The competition that results among the service providers also gives them an incentive to find innovative solutions.

Tender procedures are subject to criticism, especially because the bidders may agree among themselves on the cost and the services they provide could be overpriced as a result. The applicability of such procedures is dependent on the ecosystem services concerned and their establishment is a relatively complex undertaking. So here too the opportunities and risks are quite close together.

Transaction costs

We already discussed, in the first part of this book, the importance of transaction costs associated with PES, that is,

Additionality can lead to social injustice and be counterproductive economically: Intrinsically motivated stakeholders who behave in an eco-friendly manner out of conviction may be excluded from payments and hence punished for their proactive behavior.

In some cases, tenders are a successful means of increasing cost-effectiveness.

Transaction costs for the development of PES are often assumed in part or in full by government or by civil society intermediaries.

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So far, the transaction costs have been borne in full by the buyers and financiers only in the mandatory polluter-funded PES.

costs incurred through the organization of PES, the negotiations, the validation of the results and the like. We can only guess how high these costs are with reference to the individual examples. Consider, for example, *FRESP* or *MoorFutures*[®], the *Pumlumon Project* or *Gemeinschaftlicher Wiesenvogelschutz*; consider the effort involved in developing the PES and working out the payment mechanisms or models, the time needed to recruit both the financiers and the service providers and the time needed for monitoring, and so on. Who will cover these costs in the end and who will assume the financial risk during the development of the PES? In many cases, governmental and civil society organizations play a crucial role here, with money and expertise. It is evident, however, that there are differences in the three types of PES: Specifically in the non-governmental examples, it is neither the final service providers nor the beneficiaries who assume these transaction costs.

The situation is different with mandatory payments, particularly in the sphere of habitat banking and *Flächenagenturen*. Here, developers can assess the demand much better and develop services on that basis. So they act with far less uncertainty than is the case with non-governmental PES. In the case of habitat banking and *Flächenagenturen*, while the professional providers pay in advance, they bear only the normal entrepreneurial risk of not being able to sell their 'product' in the end. The demand is relatively well known. The supplier considers all costs when setting the price, and sometimes supplements them with a profit surcharge. The operators of the *Silvergate Mitigation Bank*, providers of *Forest Mitigation Banking in Maryland* and the *Flächenagentur Brandenburg*, set the price to cover all the expenses they incur. The price includes not only the cost of implementing the concrete measures and/or the cost of

delivering the service but also the transaction costs, that is, all the expenditures for the identification of suitable sites, measures and participants, for permits, the contract design, certification, management of the PES, monitoring and so on. In addition there is usually a surcharge whereby the provider generates profits. So here the project developers as financiers bear the transaction costs.

The situation is somewhat different with regard to the *Medford Water Quality Trading Program*. Here there is a greater risk involved in the development and in relation to the costs involved, since there is less experience to fall back on and the competition from the providers of well-established gray infrastructure is great. The civil society stakeholders involved therefore brought in expertise and work hours, primarily in the development phase, which are not covered by the buyer. These costs were assumed partly by the participating organizations and partly by third party players in order to establish such innovative payments for ecosystem services as an alternative to gray infrastructure. It remains to be seen whether a habitat banking-like situation can develop here as well and whether the development of new PES will be taken over in the future by social entrepreneurs or by purely commercially-minded companies.

In some voluntary non-governmental examples as well, such as *Upstream Thinking*, *WCC* and *Trinkwasserwald*[®], a part of the transaction cost is included in the payment amount and paid for by the beneficiaries or financiers. The cost of quantifying the ecosystem service or the biodiversity objectives, however, is often not taken into account when calculating the payment amount, especially if quantification is a major challenge. These development costs are often borne by third parties,



such as government (for example *WCC* and *MoorFutures*®) or by intermediary civil society organizations (for example *Westcountry Angling Passport* and *Blühendes Steinburg*). In many of the successful PES, volunteer services and/or the donation of expertise by various intermediaries play a particularly crucial role. The payments of buyers and financiers are often only for the actual provision of the service and do not include the cost of organizing the market situation. These are financed by governmental or non-governmental intermediaries from their own or third party sources.

The explicit goal of making a profit that is seen in almost all examples of the mandatory polluter-funded payments type is not always justified solely by the commercial organization of the suppliers and hence their increased economic focus. It also results from the fact that the suppliers pay in advance and sometimes assume a great deal of responsibility for the actual delivery of the service. This is particularly evident in the *Medford Water Quality Trading Program*: Here the supplying intermediary is co-liable in case of failure. The intermediary pays part of the fine incurred by the buyer if the agreed benefits do not materialize. Such a contractual acceptance of liability is present not only in the case of the *Medford Water Quality*

Trading Program, however, but also in that of the habitat banks and the *Flächenagenturen* as well as the German *MoorFutures*® example and the British *WCC*. In the *WCC* the privately operating project developer is required to build a kind of reinsurance that can be resorted to in the event that a service is not delivered. In the case of *MoorFutures*® the governmental intermediary assumes liability if the benefit does not materialize. In this case, however, the obligation is not taken into account in the price of the certificates but is assumed over and above that by the intermediary.

Term of contract and penalties

In addition to the points discussed above, two more aspects play an important role in the drafting of the contracts: the term of the contract and the establishment of penalties for breach of contract. Many of our examples provide for the suppliers to be bound by a multi-year contract of from five to twenty years and sometimes even longer. In only three examples are there shorter-term and more flexible solutions: *Blühendes Steinburg*, *Gemeinschaftlicher Wiesenvogelschutz* and the *Westcountry Angling Passport*. In these cases, in fact no written contracts are concluded and the service provider can decide every year whether or not to participate in the PES. Interestingly, the supplier makes that decision the moment he is able to assess whether and to what extent he can deliver the desired service: In *Gemeinschaftlicher Wiesenvogelschutz* the farmers who are addressed about their possible participation are the ones on whose land the birds are nesting. Those farmers can then decide whether they want to take the necessary protection measures or not. Potential service providers in the *Blühendes Steinburg* project are informed about

Contractual liability to ensure that the service is actually provided is important in particular for mandatory and non-governmental payments. It is assumed by the commercial suppliers or, in other cases, by civil society stakeholders and government.

The term of the contract depends on the ecosystem service concerned and the measures necessary for its delivery.

Penalties are seldom a consideration for the PES managers.

the easily identifiable characteristic species so they have a good idea as to whether or not their fields are eligible. Then they can decide in the course of the spring whether or not to participate. In the *Westcountry Angling Passport*, although the owner of the fields has invested in improving his fishing grounds, he does not enter into any contractual obligations and can decide periodically whether and to what extent he will grant access to his land and waters.

In contrast, the striking thing about the PES with longer-term contracts is that they are geared to permanent or at least long-term changes for the purpose of recovery of certain ecosystem services or the restoration of larger areas: There, the objectives include reforestation, the cessation of cultivation of agricultural land for buffer strips or changes in the management of land, the effects of which will only be visible after several years. PES in which the service providers can opt for participation every year, however, are geared to the protection and preservation of what already exists, that is, the protection of plant or animal species on a small, regionally limited space.

In the three examples of short-term agreements the question of penalties is moot, but in the case of medium and long term contracts it is certainly of interest. What happens if the service provider does not fulfill his contractual obligations? Apparently that question hardly arises! At least, penalties were rarely an issue for the developers in our examples. Details on the subject were hard to find and it was rarely raised in the talks. In the *Niedersächsisches Kooperationsmodell Trinkwasserschutz* example the amounts received must be repaid in the case of contract violations; in the governmental PES co-financed by the European Union the situation is

similar. In many other examples, however, there is no provision for such measures and, from what we were often told, they are not needed. There have rarely been any problems so far, the interviewees explained. There seems to be one overriding reason for that: Trust. This word came up in the interviews again and again and seems to mean a great deal to the developers. So in the next chapter we want to examine above all where that trust comes from and why it is important in the context of PES.



Relations transcend

In the interviews with the developers, the reports by participants and the public relations work of some of the PES, one word keeps cropping up: trust. Other catchwords repeatedly used are mutual respect and transparent communication. That these aspects are cited in relation to the successful implementation of a PES is not surprising. Now we want to look at how our successful examples meet this requirement.

One thing stands out that we already heard about in the first part of this chapter: In all of our successful examples, stakeholders from the region play a crucial role. Many PES are regionally or locally oriented, for example the *Pumlumon Project*, which relates to a hilly landscape, the *PES Blühendes Steinburg*, *Upstream Thinking*, *Gemeinschaftlicher Wiesenvogelschutz*, *Westcountry Angling Passport*, and the *Edwards Aquifer Protection Program* as well as the *Medford Water Quality Trading Program* and the *Silvergate Mitigation Bank*. All of them are focused on rather small areas. The PES initiators and coordinators are usually at home or have long been active in these regions. But even in the examples that refer to an entire state, such as the *Flächenagentur Brandenburg*, *Forest Mitigation Banking in Maryland*, *CREP Vermont*, *Moor-Futures®* and the *Niedersächsisches Kooperationsmodell Trinkwasserschutz*, or are nationally oriented, such as *100 Äcker für die Vielfalt* and *WCC*, the initiators keep stressing the importance of having employees and partners who are rooted in the region. It is crucial to speak the language of the farmers and landowners, to have a good knowledge of the local conditions and to adapt to them. This, they say, is the only way close, trusting cooperation can come about.

“Work locally and be patient!” would be one way of summing up the recommendations of the people we interviewed.

Because it sometimes takes a long time to develop trust and successfully start up a PES. There are a few examples that show particularly well why this aspect is so important. Consider the *Pumlumon Project*, the *Grünland in der Eifel* program or *FRESP*, for example: In these and other cases the intermediaries wanted to test new measures and methods for farming a certain piece of land differently than was currently customary. That took perseverance and patience. It was not always clear whether the intended target could be achieved and whether buyers or financiers could be found in the long term. Often, it took several years for these examples to show results. Many PES evolved through ‘learning by doing’ and could only be designed and implemented in the form of pilot projects with the help of open-minded, adventurous farmers.

And it was such farmers that were able in turn to convince their colleagues in the *Pumlumon Project*, *Gemeinschaftlicher Wiesenvogelschutz* and the *Grünland in der Eifel* program. Initially there were only a few, sometimes only individual suppliers cooperating with the initiators. To some extent they knew each other from previous projects, so that the skills of the others were already known and there was no fear of contact. On the basis of the cooperation of these stakeholders and initial successes, other landowners overcame their skepticism, gained trust and took part in the PES. Several of our PES came about in this manner, that is, patiently initiated by intermediaries who were more often active on the supply side. But the local focus is very important in the examples that proceed more from the buyer or financier side as well. In *CREP Vermont*, for example, local NGOs are specifically used to recruit and consult with the farmers. They pay personal visits to the farms and sometimes even send handwritten letters in order to reach potential ser-

Stakeholders who are already rooted in the region and operate transparently there are often decisive.

ing contracts

vice suppliers. South West Water, the water utility, finances the delivery of the desired ecosystem service through several local *Upstream Thinking* projects developed and implemented by local environmental associations.

Two other things are important for cooperation between stakeholders, according to the developers in our examples: respect for the performance of the farmers and consideration for their individual situation. The initiator of the *Grünland in der Eifel* program, like his colleagues in the *Pumlumon Project* and *Upstream Thinking*, points out that you have to know the worries and concerns of the farmers and landowners before you can discuss a PES with them. You need to know what's bothering them, what their goals are, what problems they have to wrestle with. These things can usually only be clarified in personal conversations with the stakeholders on the spot. *CREP Vermont* and the *Blühendes Steinburg* pilot project show the extent to which the history of the farm or the agricultural land also affects the willingness of farmers to participate: Despite attractive payments, the landowner will not let areas that his father or great-grandfather laboriously converted into fertile farmland lie fallow. Conversely, this or that farmer will associate species-rich meadows with positive childhood memories and will preserve them for that reason alone, quite independent of payment. Many of the successful examples endeavor from the outset to take these soft factors into account and to adjust their PES accordingly. The *Pumlumon Project* explicitly strives to attain not only environmental but also social objectives.

The initiators of many of the examples find out about these factors because they include the relevant supply and demand side stakeholders in the design process early. Different forms

of participation can be observed: In *FRESP* and *PEPA*, for example, independent intermediaries brought stakeholders on the supply side and the demand side together and involved both of them equally and from the beginning in the development and implementation process. In *FRESP*, as well as in the *Westcountry Angling Passport* and *Blühendes Steinburg*, the final service providers were even co-initiators of the PES. They are motivated to develop the PES further even after its successful launch and to try out new approaches. In other examples, such as the *Grünland in der Eifel* program, *Gemeinschaftlicher Wiesenvogelschutz*, *CREP Vermont*, the *Pumlumon Project*, *Upstream Thinking* and the *Niedersächsisches Kooperationsmodell Trinkwasserschutz*, more priority is given to counseling the farmers in the implementation phase. **Our examples provide clear evidence that the inclusion of all relevant stakeholders on both the buyer and the supplier side is an important building block for the success of PES. This early involvement makes it possible to uncover the key factors influencing willingness to participate and to pay, to heighten the motivation and trust of the parties involved and to avoid a number of problems upstream.** This participation process requires highly motivated intermediaries who are accepted by all sides, people who enjoy a good reputation among the participants.

It is a striking fact in all the PES that a lot of persuading had to be done on both sides, that of the supplier and that of the buyer. Often, this process is shaped by a kind of champion, a person with great personal commitment and a very good reputation with the stakeholders who takes the initiative. That person has been or is the 'face' of the project or program, and is mentioned in the same breath as or even as a proxy for

Consideration of social issues and mutual respect are helpful in establishing long-term trusting cooperation.

The early involvement of the relevant stakeholders on both the demand and the supply side can be a factor in success.



Often, an outstanding individual with a good reputation on all sides is crucial.

the PES. So when we were told about some of our successful examples people did not use their names but spoke about “Sarah Lynch’s project“, “Jon Winsten’s initiative“ or “Professor Schumacher’s activities in the Eifel“. But it is not only individuals but also organizations that play the role of champions and function as high-profile workhorses, as in the *Pumlumon Project* or the *Medford Water Quality Trading Program*. These individuals or organizations have to be courageous and venturesome. Often a great deal of endurance is necessary, along with team spirit and the ability to develop and maintain networks. Because of course the individuals are not alone, they are at the head of a well-rehearsed team or part of a well-functioning network.

The importance of networks and cooperation already emerged in the motivation of the various actors. Just as cooperation arrangements are vital for the initiation of PES, stable networks seem to be the basis for PES that are successful in the long term. The close cooperation with scientists is striking in many of the examples presented. In some cases, such as *Trinkwasserwald*[®] and *Gemeinschaftlicher Wiesenvogelschutz*, universities or research institutes are involved in monitoring the results. In other cases, scientists are the actual initiators and then the developers and coordinators of the PES, as in the *Grünland in der Eifel* program and *100 Äcker für die Vielfalt*. Cooperation with teaching and research institutions also played a very important role in *MoorFutures*[®], *FRESP*, the *Medford Water Quality Trading Program*, *PEPA*, *Upstream Thinking*, the *Silvergate Mitigation Bank* and the *Edwards Aquifer Protection Program*. The scientists were a relevant part of the design process; they provided preliminary studies, developed payment mechanisms, developed models for selecting fields

and for calculating certificates and credits, and much more.

In addition, many PES have close links with the governmental players and relevant agencies. In some examples, such as *MoorFutures*[®] and *FRESP*, the commitment of energetic ministry or agency staff is particularly noticeable. A high degree of self-motivation can be observed in these individuals as well, so that they do more than work to rule to advance the PES even against opposition in their own ranks. As for the dedicated scientists, their own biographical background appears to play a very large role and to be a driving force for these individuals.

Colleagues engaged in practical work are also a part of the established networks. Some of the PES are heavily based on cooperation with interest groups, environmental associations, external consultants and service companies. We see this, for example, in *Blühendes Steinberg*, the *Edwards Aquifer Protection Program*, *FRESP* and *CREP Vermont*, *100 Äcker für die Vielfalt* and the *Flächenagentur Brandenburg*. The high level of commitment of volunteer individuals is especially evident in *Gemeinschaftlicher Wiesenvogelschutz*, and also in the *Grünland in der Eifel* program and the projects of the *Trinkwasserwald*[®] association. Enabling this, however, requires some effort, be it in the form of personal communication or of professionally organized media work. This in turn, requires clear-cut responsibilities, appropriate contact persons and minimum bureaucracy.

Social networks of stakeholders from different sectors of society, including research, are an important building block for success.



Conclusion

It is evident that in all the PES featured in this book there are no suppliers to be found who act solely out of commercial considerations; the people on the intermediary supplier side in particular are highly self-motivated when it comes to the conservation and improvement of ecosystem services and biodiversity. These intermediaries implement PES at the regional or local level, integrate the final service providers, if they are not the final providers themselves, into the development and implementation process and, last but not least, generate a spirit of trust and cooperation. Although we have not explicitly spoken with participating farmers and landowners as final service providers within the scope of the analysis of our examples, the interviews with officials show how important it is that their participation in the PES be more than just economically motivated. The service providers have to stand behind the projects. To spark their interest, it is essential to have committed intermediaries, recognized by the stakeholders and rooted in the region or locality, in different functions.

In the present examples, the initiative for the development of successful PES comes mainly from the supply side. Even in the case of non-governmental payments, there are only three buyers who are prompted by commercial self-interest and/or philanthropic motives to initiate the development of PES. And even in the governmental PES there are only two examples where the initiative for the successful regional or local implementation comes from governmental players.

The featured PES presented here clearly show that a precise definition of the objectives is essential and a quantification of ecosystem services or biodiversity objectives offers the option of output-based payment. In practice, model

approaches to calculating performance are far more decisive than monetary valuations.

In the light of the present results, one may wonder whether it is even possible, given the complexity of ecological systems, to ensure the effective and efficient provision of ecosystem services and biodiversity – that is, conditionality – through purely economic relationships. Adequate contract drafting is of course important for PES, but even the most sophisticated contracts (including a complex system of penalties) can hardly make up for a lack of motivation and mutual trust.

In particular, the development of pilot projects is a decisive step towards establishing longer-term PES that build on the experience gained. To develop truly innovative approaches, of course, failure must also be a possibility. Behind the successful PES presented here there are certainly previous projects that did not ultimately lead to success for various reasons. If we want to promote the development of innovative approaches, financial support for the development and establishment phase appears to be crucial, especially if it is not yet clear who will be the buyer or financier in the end.

There is one last point that should be mentioned: In many PES we see close cooperation between scientists and developers, and sometimes they are even the same persons. This is not surprising in view of the great challenge that quantifying ecosystem services poses. Apparently it helps, however, if scientists are not only guided by research interest but are also interested in solving the actual practical problem and act out of a spirit of social responsibility as well.



Guide. What may the future bring?

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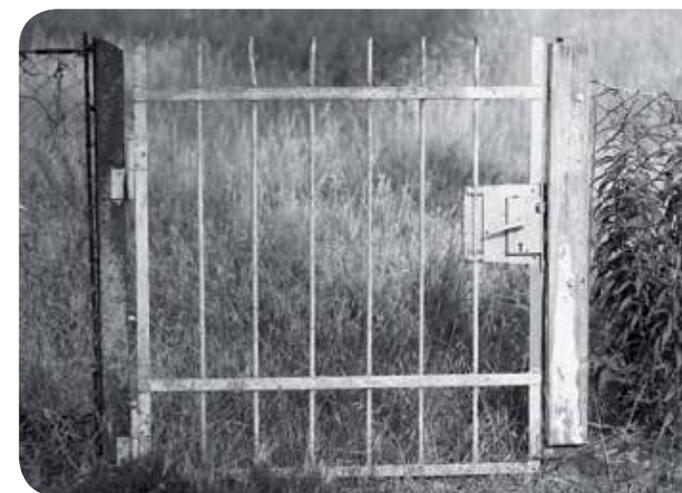
Potentials, limits, challenges

This book aims to show on the basis of various successful PES where the potential of this tool lies and how it can be used so that PES can claim a permanent place in the canon of environmental management strategies. In the light of that objective we have presented various examples, all characterized by the fact that in each case those whose actions contribute to ecosystem services and biodiversity being preserved or even to the environmental situation being improved are rewarded. However, the examples of PES practice are often far from being a so-called market solution: Governmental stakeholders play an important role, and often success comes only through the combination of various incentives and motivations.

Thus our examples can be seen as an urgent plea not to hope for a free market in ecosystem services, but to take joint and purposeful action to develop such a market, taking into account both existing regulatory law and social norms and intrinsic motivations. The PES presented also make it clear that using the tool involves more than just matters of effectiveness and efficiency. Above all, it is a matter of the distribution of rights of use and thus of social issues of justice. It is not least in that light that the use of PES is rightly criticized in terms of free market solutions. Especially in developing but also in industrialized countries, questions of distributive justice and of socio-cultural context arise when PES come up for discussion as a possible solution. PES can but by no means must be an appropriate solution. The basic prerequisite for the successful development and implementation of PES is that the socio-cultural environment and the existing institutional settings are taken into consideration. If that is done, the stepped up use of

PES in the broad interpretation offered here could contribute to an improvement in the provision of ecosystem services and biodiversity. The concrete design of the instrument, taking into account the specific environmental situation as well as the stakeholders involved, is also crucial. Our examples provide a wealth of new ideas about what a successful PES design might look like and how the various stakeholders can be integrated into it.

In this chapter we have grouped together our findings regarding the limits, potentials and challenges related to PES – not only in light of the examples presented but also on the basis of the years we spent studying PES. These are aspects that we consider to be particularly relevant for the critical, strategic development and utilization of PES. Since the focus of our research work was on Germany, the United Kingdom and the United States, these points refer mainly to the use of this tool in the industrialized countries. We end by formulating a few recommendations addressed in particular to the governmental players with which we want to enrich the current debate about the targeted use of PES as a useful environmental policy tool.



“Interdisciplinary negotiating and working is fundamental. If only one representative determines the service, then the concept will fail.”

Scientist, Germany

Actual win-win situations rarely result from PES.

The supporters of PES and other interested parties consider the tool attractive, in particular where voluntary non-governmental and governmental payments are involved, because on the face of it this leads to a win-win situation: One side receives a service, the other side is paid for providing that service. The principle of free choice prevails. Governmental PES that are implemented, for example, in the context of agri-environmental programs are likely to meet with less resistance than if one were to try to impose the same measures by way of regulatory legislation.

However, it is not just in our examples of non-governmental and governmental payments, in particular in many major governmental agri-environmental programs, that payment is made for the reduction or avoidance of negative external effects on ecosystem services and biodiversity. The costs of these externalities are thus socialized with the help of the PES, while the profits of the commercial stakeholders remain private. That can be socially desirable in many cases, for example because agricultural use would otherwise be uneconomical under the given circumstances. Such questions of distributive justice, however, should always be presented and discussed openly. It is therefore highly relevant that the decision-making processes be transparent, and that the distribution of power always be scrutinized critically. Strictly speaking, there is no real win-win solution when it comes to voluntary payments relating to negative externalities. Because there is, of course, an alternative: Society can use regulatory legislation to impose environmentally friendly behavior. Then the general public or the private beneficiary could use the service for free, for example because people have a right to clean water. So disclosure of the bene-

fit and the beneficiaries within the framework of the ecosystem service approach does not mean that the beneficiaries have to pay for it. Quite the contrary: When something provides an especially great benefit to society, there is all the more reason to avoid negative effects.

Real win-win situations occur whenever the pollution rights are clearly allocated to the land users prior to introduction of the PES and certain human actions are required to provide the benefit to society. That is the case in the European Union, for example, in landscape conservation measures to preserve the cultural landscape and the related ecosystem services and biodiversity, and it also applies to restoration measures to recover certain habitats. Win-win situations for all those concerned also arise when the ecosystem service can be used as an inexpensive alternative to gray infrastructure.

Monetary valuation of the benefits of ecosystem services and biodiversity play a limited role in PES.

The increased interest in PES is closely connected with the mainstreaming of the ecosystem service concept. Accordingly, many objections to PES are based on the critique of the concept of ecosystem services and in particular on the monetary valuation of nature, which is closely associated with the concept. The PES concept was taken up in particular in connection with the policy in developing countries, because those countries often provide global ecosystem services and because that is where the hotspots of worldwide biodiversity are to be found. The international discussion about the monetary value of benefits such as those generated by rainforests provided good arguments for an international financial commitment to their preservation. Since then, putting a price on ecosystem services and

determining the degree of willingness to pay for biodiversity seems to be a fundamental prerequisite for the implementation of PES. And this in turn feeds the criticism of this tool.

However, a closer look at the amounts of payment in existing PES shows that such a monetary valuation of the benefits of ecosystem services or the identification of individual willingness to pay for biodiversity is not all that relevant. Instead, where the prices are not (or cannot be) set by free markets the opportunity cost and/or the cost of production are used to determine the amount of payment. Hence a monetary valuation of benefits in the strict sense is not undertaken, nor does it need to be. This applies particularly to the many PES where payment is made for the avoidance or reduction of negative externalities. After all, there is little reason to concede profits exceeding compensation for their opportunity cost to providers who reduce, for example, the water pollution they themselves cause in order to provide clean surface and ground water. That might make sense if it were the only way to ensure the participation of the stakeholders, and even then one could certainly question whether the financial incentive alone is really the right tool in such a case.

However, there are certain reasons why the monetary valuation of the benefits of ecosystem services and the determination of the willingness to pay for biodiversity can be quite useful. Among other things, the disclosure of these values can help in finding financiers and enhancing the social legitimacy of governmental PES. In the debate about transaction costs and the actual producer surplus as well, concrete ideas of the extent of the benefits and of the willingness to pay are useful. You can get an idea from the examples in this book how high the transaction cost can be from the development up to the moni-

toring of PES. These costs are hardly ever properly quantified. Nevertheless, they must be borne by someone. That is why high transaction costs are often seen as an argument against the use of PES. Targeted governmental agri-environmental measures in particular, which are of great importance for nature conservation, are often called into question because of the high administrative costs. If these costs could now be contrasted with the monetary value of the ecosystem services or protected biodiversity provided by the measures, it would be a different matter. So describing the high monetary benefits generated by a PES might help to justify the high organizational and administrative costs, thereby increasing the willingness to pay for transaction costs.

Similarly, the monetary valuation of ecosystem services and/or the uncovering of the willingness to pay for biodiversity could enrich the discussion about additional financial incentives for providers, that is, the producer surplus. Because though we have just been arguing against additional financial incentives on top of the opportunity cost in the case of payments for the reduction of negative externalities, when it comes to payments for positive externalities the situation is quite different: If a farmer produces species-rich grassland instead of green fodder for his cattle, there is no economic reason why the beneficiaries or whoever is willing to pay should not pay more than just the opportunity and production costs, generating a real incentive effect through the so-called producer surplus. People are already working with such producer surpluses indirectly in some agri-environmental measures. In one German federal state the lump-sum payment amount per hectare is especially attractive, for example, on sites with relatively low yields. Coincidentally, those are often the sites that are relevant from a conservation perspective as well. But should something like that be left to

“We've got to recognize we are here trying to price the priceless but if putting an economic value on natural capital helps us to view it and value it in different ways for certain audiences, then I think that we'd be wrong not to try it.”

Scientist, United Kingdom





“Monetizability is an important aspect if this concept is to be carried forward and become relevant. That does not necessarily mean, however, that all ecosystem services ultimately have to be monetized.”

Environmental protection agency staff member,
Germany

chance? Or shouldn't the difficult question of producer surplus be tackled much more openly? If we want to answer these questions, the monetary valuation of the benefits from ecosystem services and biodiversity could serve as a basis.

And finally, monetary valuation of the benefits or determination of willingness to pay could also play

an important role in new innovative approaches, such as the so-called ecological fiscal equalization, and create incentives to protect nature and the environment for regional and local policy makers as well.

Thus monetary valuation can be useful for certain aspects of the development and use of PES, but for most PES it is not essential and so far we have not seen it used in practice to determine the amount of payment. It is common practice, however, to determine the payment amount based on opportunity and production costs. Unlike the monetary value of the benefit or the willingness to pay for biodiversity, these costs are relatively easy to determine. It is amazing, however, that there is so much critical discussion about the monetary valuation of the benefits of nature in connection with PES while the use of the opportunity cost approach is so much less often subjected to such criticism. Although sometimes it is here that the real challenge lies, for if the opportunity cost is used to determine the amount of payment, PES are bound by the prices of products of alternative resource use, and especially by the (world market) prices for agricultural products. This results in severe dependence on global market developments and the related

prices for the purchase or lease of land. In Germany the current high world market prices in combination with the promotion of renewable energies are causing extreme competitive pressure – often referred to as the competition for land. The opportunity costs are rising and the prices paid up to now within the PES framework are losing their attractiveness for the farmers. Long-term contracts are virtually impossible to implement given such fluctuating prices, but these are needed for many ecosystem services if PES are to have any impact.

From the free market point of view, one might argue that if we do not pay enough then the service is obviously not worth enough to us. That way of seeing things, however, ignores the complexity of ecological systems and the global relationship between them, which actually make risk averse action urgently necessary. It is illusory to think that price fluctuations can be integrated into PES flexibly and promptly, and it does not seem very desirable to subject the protection and the provision of ecosystem services and biodiversity to the short-term interests and speculation of a globalized financial world. Let us assume that world market prices for certain agricultural products are so high over a period of ten years that payments in the PES framework cannot compete. Following free market logic, all species-rich grassland in Europe would then most likely be converted and the Brazilian rainforest cleared to a considerable extent. Irreparable damage that no market can ever repair! PES alone could not put a stop to this development. For the cases described, the failure of the market cannot be remedied by means of economic tools. Instead it is imperative that regulatory legislation and economic incentives be creatively combined more energetically than has so far been the case.

The quantification of ecosystem services and biodiversity objectives is a prerequisite for PES.

While putting a price on the benefit or determining the willingness to pay is not essential for PES, the quantification of ecosystem services or of the relevant biodiversity objective is a decisive requirement. Both the communicative strength of the ecosystem service approach and the basic PES principle of 'Paying for ecosystem services and biodiversity' require quantification of exactly these services so that at least the often-addressed conditionality can be verified in the context of appropriate monitoring approaches. Only then will a constant search for the right (middle) course be possible, only then can there be constant adjustment.

But that very prerequisite for PES, the quantification of the services provided by ecosystems and biodiversity, is a major criticism of the tool: A quantification of individual services, as well as the anthropocentric view of ecosystems in general, does not, it is said, do justice to the complexity of ecosystems, the interaction and interdependence of their structures and processes. These structures and processes are interconnected in many ways, and especially in each ecosystem or landscape. This criticism of PES too is based on the underlying ecosystem approach, and it is legitimate. Amid all the criticism, however, there are two things that should be borne in mind: First, this complexity is currently not ascertainable by any approach, and it probably never will be. Second, all those who want to directly influence the development of ecosystems have to deal with this complexity. Against this background, it is true that the ecosystem service approach as a fundamental PES concept can never act as the central or indeed the sole approach to the analysis of ecosystems and landscapes. It is important to have a combi-

nation of several analytical approaches by means of which the ecosystems affected can be understood as much as possible and the internal and external interactions can be identified as well as possible. This necessary analytical diversity should by all means be reflected in PES monitoring. Moreover, specifically with reference to the ecosystem service concept, we should try to take the various ecosystem services of an area into account within the PES framework in a meaningful way and better than in the past.

There is another aspect to be put forward when we talk about the need to quantify ecosystem services and biodiversity with regard to PES. From the perspective of many of the managers interviewed, especially in the United States, PES are defined not just by a quantification of ecosystem services and biodiversity objectives alone but by the fact that the payments are linked directly to the services, so that what we have is output-based payments as we understand them. Actually this is the type of payment arrangement that best corresponds to the PES concept; it is very useful economically and should be aspired to. The quantification of the service is thus a prerequisite for ideal PES, even if, in particular because of the complexity of socio-ecological systems, these cannot always be used in practice, as a discussion that has been going on for several years in the area of agri-environmental measures has shown.

In the light of the great importance of quantifying ecosystem services, international and national initiatives and projects that rise to this challenge are to be welcomed. This should take account of the lessons from a decades-long discussion on environmental indicators: Service performance recording depends on the context. Certain approaches to recording ecosystem services are particularly suitable for purposes of politi-

“This is an emerging industry. But to have someone paying for goods and services you have to have hard data to prove that what you have done actually had an impact on a good or a service.”

Environmental organization staff member,
United Kingdom

“There is a move for better focusing EU funding to reward public goods and the buzz word is Ecosystem Service, so it is clearly shaping things.”

Environmental protection agency staff member,
European Union



cal argument and are therefore extremely important. If we want to further promote PES or indeed pay for outputs, appropriate quantification approaches must be further developed. These can differ from those previously mentioned with regard to the geographic scale and the models used.

PES need an active and innovative government.

The growing interest in PES shown specifically by governmental players, which link the tool particularly with voluntary non-governmental payments, is not infrequently justified with shrinking public budgets. At least the critics of the current developments suspect that government encourages the establishment of non-governmental PES above all because it wants to evade its responsibilities for enforcing regulatory legislation and financing environmental measures and wants to leave things to market forces. There is one answer to those fears, however, as well as to any hopes of government withdrawing: The successful launching and implementation of PES requires not less but more governmental intervention!

The vast majority of ecosystem services as well as biodiversity exhibit the characteristics of public goods, meaning the benefits can be enjoyed free of charge. Ecosystem services and biodiversity are at the same time affected by a variety of negative externalities. Since the ecological phenomena we are dealing with are, moreover, very complex, it is illusory to assume that traditional markets for ecosystem services and biodiversity will emerge on a larger scale independently. Instead, players are needed who have societal well-being in mind and actively and critically advance the development of PES as one possible approach to addressing the problems. Government therefore has a far greater role than just the traditional one of establish-

ing and enforcing property rights. In the PES context, it is called upon to be an active market participant and intermediary. Government can ensure, for one thing, by means of more flexible regulatory legislation, that demand motivated by regulatory legislation leads to more widespread use of PES. It can make use of different management approaches, and in particular it can ensure effective interplay between regulatory legislation and economic incentives. For another thing, over and above any approaches connected with its sovereign power, government can (i) take on the financing of actual payments in the framework of PES in the name of social demand, (ii) finance the development of innovative PES projects and (iii) act as an intermediary with a variety of tasks and thereby reduce in particular the transaction costs of the other stakeholders.

The current number of governmental PES alone all over the world is enough to show the importance of government as a financier. When it comes to future developments, the expectations of different stakeholders in the field also show how significant governmental PES are: A long-term payment obligation in particular is beyond the means of many non-governmental stakeholders.

The examples in this book are enough to show clearly the importance of governmental commitment to the development of innovative approaches. Their development, like the design of new PES as a whole, involves considerable effort and is subject to the risk that a longer-term implementation will not be possible or will not be worthwhile. Accordingly, it is essential to finance pioneering projects if the PES approach is to be pushed ahead. In addition to civil society stakeholders such as foundations, government is needed here. Its investment in innovative pilot projects can ultimately benefit its own, already established

PES as well: If the new ideas prove useful – if, for example, one succeeds in adequately assessing an ecosystem service by means of models for a PES – the lessons learned can be used in the context of governmental payments, in particular those for agri-environmental programs, to increase their effectiveness and efficiency. And that might well be necessary in the government interest: In our view the further development of those governmental PES in the direction of the even more targeted delivery of ecosystem services and the successful achievement of biodiversity objectives is a central task of government.

But PES need government as an intermediary as well, as many of our examples show. Governmental players are active in various roles within the framework of PES, inter alia in connection with liability issues and as a monitoring body. They are thus not only very important financial partners but also substantive partners in the development and implementation of PES.

The interaction between PES and regulatory law should be reconsidered.

We have already mentioned it several times, but we want to say it here explicitly once again: PES are not in competition with regulatory law and certainly do not replace it! Instead we advocate that the opportunities for interaction between the two tools be explored thoroughly from the point of view of effective environmental protection. There are examples in this book and elsewhere of how flexible regulatory law can ensure that PES materialize. They show, for example, that one can invest in green instead of gray infrastructure in the course of compliance with regulatory law, thus providing a variety of ecosystem services. Government, then, has the option of using the different management approaches and organizing their effective

coexistence. Through interaction with economic tools, it can make regulatory law more flexible and thus improve its efficiency, as we can see in habitat banking in the United States.

At the same time, regulatory law is often mandatory for reasons of effectiveness and efficiency, to protect ecosystems and biodiversity in the long term. To rely solely on financial incentives would be far too risky given the complexity and sensitivity of many ecosystems. But here too, a combination of the two management approaches is possible. When the application of regulatory law is necessary to preserve very valuable habitats, for example, it may be expedient for reasons of distributive justice to let society bear the cost of the legally mandated limitation of use and pay the land users affected. However, well-functioning interaction between regulatory law and positive financial incentives is an extremely ambitious target. That may be why the experts we interviewed did not rate any payments to offset regulatory law requirements, that is, examples of the fourth type described in the concept chapter, as successful. Such payments are certainly made in practice, for example in Europe within the framework of the European Nature Protected Areas of the Natura 2000 networking program.

Basically, the practice of regulatory law in the industrialized countries up to now has been to formulate the exact threshold where a service becomes worthy of being rewarded. It determines from what point onwards the additionality condition is met and payment may be made for providing services beyond the legally required level. “It would never enter our heads to reward a driver financially for stopping at a red light.”, as one expert very aptly put it. However, the situation in terms of nature protection is often more complicated, for example when it comes to the designation of protected areas in Europe. The

“What if it’s not about regulation but you’re just trying to get people to do the right thing. They don’t have to do it but you are trying to push them in that direction of doing it. I don’t think you can have effective PES without regulation. I think they go hand in hand. The question is are you giving more options, more micro level freedom to achieve those macro level targets.”

Scientist, USA

environmental objectives often require restrictions on agricultural use, in particular on intensive farming, and that is enforced through the protected area regulations. Now it is certainly part of the so-called social obligation in Germany that the situation may call for restrictions on economic activities. That has always been a bone of contention. But the contention is heightened if these regulatory requirements now mean that governmental payments in the context of agri-environmental measures are ruled out. This means that a farmer who actively preserves ecosystem services or protects biodiversity receives no payments if it is done in protected areas and is prescribed by regulatory law to secure long-term protection, while the same measures in areas outside of the protected area are rewarded. We cannot engage in an intensive discussion of this issue here. But the example shows that PES are especially difficult to integrate into a highly sophisticated system of regulatory law. This situation is already being responded to in practice. In Europe, payments are accepted and used under certain circumstances for services required under regulatory law. However, should this combination be replicated? What will it mean in practice if regulatory requirements in designated protected areas are associated with a long-term financial burden on budgets? The potential conflicts that may arise from the introduction of PES in conjunction with regulatory law should not be underestimated. But at the same time, the interaction of regulatory law and PES for certain situations should be urgently reconsidered. Not only the above-mentioned payments for regulatory requirements in Natura 2000 areas but also examples of PES in developing countries show that financial incentives are already currently used as an additional approach to help implement environmental legislation, for example regarding deforestation. Given the frequent failure to enforce regulatory

law, PES are seen particularly in developing countries as an opportunity to spur more implementation of environmental protection.

Dedicated, regionally active intermediaries are needed. Civil society players are especially suitable for this.

Successful PES are often developed ‘bottom up’, by intermediaries who want to put something in motion from the supply side. These initiators have typically been rooted in the region for a long time and know the environmental problems as well as the economic problems of service providers on the spot. On that basis they are developing new, creative ideas, taking them to the local people and fighting for their implementation. They have the trust of the population, gain a hearing for new approaches and are available as a point of contact for questions and criticism. Such ‘champions’ are often outstanding individuals or sometimes small associations or foundations that are engaged in nature conservation, science or politics, sometimes even have experience in all these areas and enjoy a high reputation at the various levels.

However, even the larger, usually governmental PES, ones that are developed ‘top down’, need dedicated, regionally rooted intermediaries. Through their direct, close contact above all with farmers on the ground they can take the program to the region, identify suitable areas, address potential service providers and give them advice and guidance if they decide to participate. Efficient, specialized monitoring too is often only made possible by regional (volunteer) players.

Civil society players rooted in the region are particularly well suited to this role of intermediary. They have local knowledge and expertise, have often been acquainted with the land



users in the region for many years and know their concerns and needs, the potential that can be tapped and the local conflicts of interest. They speak the local dialect and are embedded in a broad network through which they can mobilize volunteers. They do not act on behalf of the government, so they are often free of red tape and are considered more trustworthy than governmental stakeholders. Not infrequently they have their own land in the region where they can test innovations together with their tenants.

These civil society players may act as financiers of PES for a limited time, especially in pioneering projects. It is hardly possible for them to act as financiers permanently, however, and often that is explicitly not the aim of their activities. More often, they act on the supply side and represent service providers in negotiations with buyers and financiers. They often manage to recruit several financiers, and sometimes to combine governmental and non-governmental resources or to recruit wealthy buyers from the business world.

PES are an important means of communication.

The concept of ecosystem services serves first and foremost to make visible the services of nature and its value for the people. Once it is made visible, it can be communicated and can provide arguments in favor of environmental protection. This makes it possible to show that each and every one of us always and in many ways profits from the services of ecosystems and biodiversity, often at no cost to ourselves, and that our everyday decisions affect those services. Hence the application of the ecosystem service concept can lead to improved communication and greater consideration of the interests of nature conservation in politics and the economy and contribute to increased

“You need highly motivated and passionate people. Without passion and enthusiasm nothing will happen. No one thinks in terms of working time and free time, it is living time. It won't work any other way.”

Environmental organization staff member, Germany

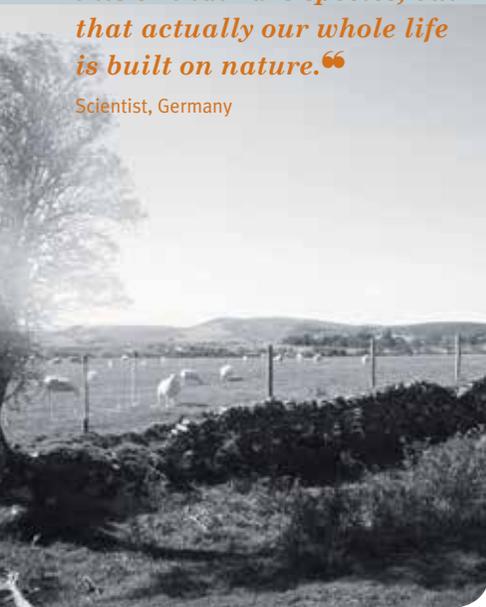


public awareness of the relationship between environmental policy and welfare.

Its specific application in the context of PES also makes it possible to show farmers and foresters that they not only negatively affect ecosystem services and biodiversity, but also actively contribute to their being provided. As service providers in the context of a PES, land users become more than mere aid recipients, since they help bring about social benefits in the form of public goods: In addition to food products or bio-energy, they now ‘produce’, for example, habitats for endangered animal and plant species or help minimize negative impacts on ecosystem services and biodiversity. The creation of an appropriate self-image, connected with appreciation of their work in the form of financial remuneration and respectful, transparent integration into decision-making processes, could create an awareness among land users that would increase their propensity to participate in PES in the long term. In addition,

“The strength of the concept lies in bringing not just conservationists into the conversation but the beneficiaries as well. It makes this participatory thing possible and you have a common basis for talking about your interests. The main potential for me is communication, including communication with the public, about why we even need conservation. That it is not just about this or that rare species, but that actually our whole life is built on nature.”

Scientist, Germany



such awareness could encourage farmers not to be guided solely by the amount of the payment, so that PES are not solely dependent on the development of opportunity costs. So not only should the destruction of intrinsic motivation, the so-called crowding-out, be avoided through appropriate design of the PES, but the potential for crowding-in phenomena should be tapped in practice and studied by researchers.

Clearly communicated objectives and hence payments for specific services can also help in the context of large agri-environmental programs to alleviate the pressure to prove the legitimacy of governmental payments. A clear focus on the provision of defined ecosystem services and biodiversity objectives prevents the payment of hidden subsidies for agriculture, and can thus promote the necessary trust in political processes.

Non-governmental PES might become more important in the future.

Given the current developments in the field of PES, it is foreseeable that the ideal type of user-financed PES will continue to be rare in the future and limited mainly to the water sector and tourism. The number of non-governmental PES could increase all the same, notably due to increased awareness among consumers. A positive green image of businesses could continue to gain importance in the face of a certain degree of rising environmental awareness, which could well bring with it increased willingness on the part of businesses to pay for the provision of ecosystem services and biodiversity within the framework of PES. At the same time the commitment of private individuals could increase, as the interest in voluntary compensation payments in the area of carbon emissions indicates. The results of the few studies that have so far been carried out on all these

developments and our own experience in the analysis of existing PES, however, imply that a voluntary market for ecosystem services and biodiversity is precisely what needs to be actively developed. It is not to be expected that the initiative will come from businesses and private individuals. That is why there is a need here for intermediaries who manage to transform ecosystem services and contributions to biodiversity into communicable and marketable ‘products’ and above all to initiate the corresponding demand.

Once again it will be necessary to take a critical look at the motives of the players in the market, because of course there is a risk of greenwashing. To counter that risk, there will have to be considerably more than just an economic interest on the part of at least one party (buyer or supplier) in the actual delivery of the service. It remains to be seen what potential actually resides in non-governmental PES and whether business stakeholders and private individuals will really go beyond the mandatory payments in the future to act as financiers of effective PES.



Our recommendation

Conclusions: Our recommendations for the establishment of PES as a useful environmental policy tool

→ The concept of ecosystem services and PES should be understood and used more as a means of communication.

This requires that attempts to quantify the benefits of ecosystems and biodiversity be encouraged while raising awareness of the limits and risks. It also involves promoting the development of sound PES-compatible models.

→ The use of green instead of gray infrastructure should be stepped up.

To make progress in that direction, it could be useful to make it mandatory in certain projects to strike a balance between gray and green infrastructure as well as to introduce appropriate green infrastructure consultancy services.

→ The general distribution of resources must be regulated in transparent policy-making processes.

This particularly applies to governmental PES, where answers to questions of distribution must be found for concrete cases in the course of their design. To reduce unilateral influence and abuse of power in particular, this must be negotiated not only within the administration.

→ A more flexible system of regulatory law should be complemented by the trading of ecosystem services and biodiversity standards.

That is one way to make use of any untapped effectiveness and efficiency reserves. The interplay of regulations and economic tools needs to be monitored very critically, however. This applies in particular to approaches such as habitat banking and Flächenagenturen. If the motivation of the service providers is purely economic, a precise formulation of the compensation requirements and governmental and possibly civil society control is imperative. The cost efficiency advantage that can actually be gained needs to be examined concurrently.

→ Government should actively support the development of voluntary markets for ecosystem services and biodiversity and the involvement of non-governmental financiers.

It seems to be particularly important to promote the development of standards and certificates or credits and to support pioneering projects financially. The main focus should be on innovative concepts for cooperation among relevant stakeholders, by means of which transaction costs can be reduced or shared.

→ Government should use its own capacities to reduce transaction costs.

In addition it should examine whether it can also assume or reduce the transaction costs incurred within the framework of voluntary non-governmental PES. Experience shows that municipal government structures are particularly well equipped, for example, to raise taxes specifically to be used for PES at the local or regional level. Existing examples pertaining to water offer some ideas.

ns for action

→ **Governmental agri-environmental programs should be further developed specifically for the purposes of governmental PES.** The diverse activities to quantify ecosystem services and the agricultural policy efforts should be better linked for that purpose. This seems reasonable particularly in light of the global commitment to quantifying ecosystem services. Their effectiveness could be improved and their legitimacy in the eyes of the public significantly enhanced if governmental payments were clearly directed toward the provision of defined ecosystem services and biodiversity.

→ **The strengths and capacities of civil society stakeholders rooted in the region should be used and promoted in the context of governmental PES.** In particular, regional and local civil society stakeholders should be involved as implementing partners. Governmental programs should be implemented in active cooperation with non-governmental stakeholders.

→ **Each existing institutional setting and the specific socio-cultural context must be taken into account in mainstreaming the PES approach.** Accordingly, whether such an economic approach is suitable for a certain region must be examined individually and thoroughly. In particular, the possibility of destroying people's intrinsic motivation to commit themselves to the protection of nature and the environment without payment should be critically examined.

→ **There should be a new discussion about how to deal with the call for additionality.** Additionality should not be considered only in terms of cost effectiveness. PES must not punish proactive private and public nature conservation and thus possibly weaken it in the longer term. Considerations of both fairness and economics speak against this, since proactive behavior is important if you want to encourage innovation in the context of dynamic efficiency.

→ **The dissemination of knowledge and experience from successful PES should be promoted more.** On the whole, there is a need for greater interchange among the stakeholders and for the development of supraregional networks.

“It is about spreading the word really and getting people to buy into it and believing in it and actually to value it.”

Environmental organization staff member,
United Kingdom



Glossary

Acre

A unit of area used in the United States to measure tracts of land; equivalent to approx. 0,4047 ha.

Additionality

Requirement for a PES that the ecosystem service would not have been provided or the biodiversity target would not have been reached without payment being made in the PES context. (also referred to as net positive difference)

→ Conditionality, Leakage

Agri-environmental programs (of the European Union)

An important tool of European agri-environmental policy, introduced in 1992. The aim is to promote sustainable and environmentally friendly land management by rewarding certain farming practices that go beyond 'good agricultural practice' (for example diverse crop rotation, the preservation of regionally adapted crop varieties and livestock breeds, grassland extensification). Farmers decide voluntarily to take part. Participation is generally for at least five years. EU law provides the framework for the programs, their concrete development is the responsibility of the competent level of government, which in Germany is mostly the federal states. The programs are funded jointly by the European Union and the Member States. In the institutional setting all these payments can be designated as governmental PES. However, they often lack a clear focus on specific environmental objectives or the conditionality requirement is insufficiently met.

→ Common Agricultural Policy (CAP) of the European Union, Conditionality, Contractual nature conservation, European Agricultural Fund for Rural Development (EAFRD)

Beneficiary

A stakeholder who benefits directly (the user) or indirectly from the provision and/or enhancement of ecosystem services and biodiversity. We also include all those who are willing to pay for the existence of biodiversity, even though they do not directly benefit from it.

→ Buyer, Customer, Financier, Intermediary, Service provider, Supplier

Biodiversity

Designation for the diversity of animal and plant species, genetic diversity within individual species and the diversity of ecosystems and their functions. In the social debate, the objective of maintaining biodiversity is justified not only by its use value as an ecosystem service but also by the mere appreciation of its existence ('non-use value'). Many people are willing to pay for certain biodiversity objectives even though they cannot reap any benefits from their existence. (also referred to as biological diversity)

→ Ecosystem service

Birds Directive

Nature conservation directive of the European Union, aimed at permanently protecting the stocks of bird and migratory bird species naturally occurring throughout the EU (codified version of Directive 79/409/EEC of 2 April 1979 on the conservation of wild birds; in force since February 2010 as Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009). To this end, the hunting and use of birds is regulated and bird sanctuaries (Special Protected Areas) are selected according to uniform EU-wide standards and placed under protection.

→ Directive on Flora, Fauna and Habitats, Natura 2000

Buyer

A stakeholder who pays for the provision of ecosystem services or for the protection and enhancement of biodiversity in a PES and is the actual beneficiary.

→ Beneficiary, Customer, Financier, Intermediary, Service provider, Supplier

Carbon sequestration

Describes the fixing of carbon in a carbon reservoir other than the atmosphere, for example, in peatlands and forests.

Certificate

In the German-speaking countries, this is the 'currency' that is used in the context of some PES, determined by a defined procedure.

→ Credit

Civil society

The term is used in very different ways. Often a distinction is made between a sectoral and an action-related definition. While the latter refers to certain (social and political) forms of action that are found in various sectors of society, the sectoral definition distinguishes between precisely those sectors, namely government, business, the private sphere and civil society and thus emphasizes the 'spaces' or 'spheres' in which civil society action occurs. We have endeavored to link both definitions, and we speak of civil society whenever people get involved outside of government or purely economic activities in order to (help) shape social processes.

Clean Water Act (CWA)

The CWA is the primary federal law governing water pollution in the United States, adopted in 1972. The objective of the Act is to restore and maintain the integrity of US surface waters by preventing their pollution. The CWA distinguishes between point and nonpoint sources of pollution. (also referred to as the Federal Water Pollution Control Act)

→ Water Framework Directive

Common Agricultural Policy of the European Union (CAP)

The comprehensive monitoring and financing instrument for environmental protection in and with agriculture in the European Union. The CAP consists of two 'pillars': Income support measures for farmers are funded in the first pillar. In the second, rural development and the positive impacts of agriculture on the environment and landscape are promoted, in part through agri-environmental programs and the EAFRD.

→ Agri-environmental programs, European Agricultural Fund for Rural Development (EAFRD), Contractual nature conservation

Common good

Describes a good from whose consumption nobody can be excluded or someone can be excluded only with disproportionate effort. At the same time there is rivalry between the beneficiaries, since consumption by one impedes or prevents consumption by another. Classic examples are overcrowded public streets or accessible, non-regulated fish stocks. (also referred to as common-pool resource, common property resource)

→ Public good

Conditionality

Requirement that the service paid for in a PES is actually provided and/or that obligations and measures are actually carried out.

→ Additionality, Leakage

Conservation Bank

Stockpiling of the means to compensate for impacts that threaten the habitat of endangered animal and plant species. The legal basis is the Endangered Species Act, which contains specific provisions for restoring destroyed habitats. Important habitats for endangered species are restored or created and maintained on permanently protected areas. These activities have to specifically serve as compensation measures. Project developers committed to undertaking compensation measures elsewhere in the course of the approval procedure can fall back on such measures in the form of credits. (also referred to as Endangered Species Bank)

→ Credit, Eingriffs-Ausgleichsregelung, Endangered Species Act, Flächenagentur, Habitat Banking, Mitigation Bank

Conservation Easement

Contractual agreement under which a landowner voluntarily and as a rule indefinitely waives certain rights of use (primarily construction, conversion, intensive farming). He remains the owner, however, so in the case of sale or inheritance the easement passes to the new owner. A conservation easement can be donated or sold.

Contractual nature conservation (Vertragsnaturschutz)

Voluntary contractual agreements on the priority implementation of nature conservation objectives in the European Union. The agreements are entered into between the environmental agency and landowners or farmers and generally apply to very specific conservation measures aimed at the conservation of concrete areas particularly worthy of conservation (for example specific conservation areas). Management practices are agreed on with the landowner or farmer and he is paid for their implementation. The borderline between these and the agri-environmental programs is hazy. The only categorical distinction that is currently made is that contractual conservation measures are not directly embedded in the CAP, that is, they are not co-funded by the European Union. This gives the agencies more flexibility in drawing up the agreements.

→ Agri-environmental programs, European Agricultural Fund for Rural Development (EAFRD), Common Agricultural Policy of the European Union (CAP), Natura 2000

Credit

In the English-speaking countries, the 'currency' used in the context of some PES, determined by a defined procedure.

→ Certificate, Emissions trading

Crowding out

The potential displacement of intrinsic motivation by external incentives. If the external incentive is lost, the behavior originally displayed gladly and voluntarily is reduced as well. The opposite effect is called crowding in.

→ Intrinsic motivation

Customer

A stakeholder who is prepared to pay for the protection and provision or enhancement of ecosystem services and biodiversity within the framework of PES. Generic term for buyer and financier.

→ Beneficiary, Buyer, Financier, Intermediary, Service provider, Supplier

Directive on Flora, Fauna and Habitats

Nature conservation directive of the European Union designed to maintain and protect wild animal and plant species and their habitats and the Europe-wide networking of such habitats (Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora). For this purpose, specific areas are chosen according to uniform EU-wide standards and placed under protection.

→ Natura 2000, Birds Directive

Ecological financial compensation

Local agencies in Germany derive a large part of their revenues from the municipal equalization fund. Population is currently used as one of the main indicators for the

distribution of financial resources. The concept of ecological financial compensation provides for greater consideration of environmental services in providing incentives to municipalities to give greater consideration to nature conservation concerns. For example, protected areas could be used as an indicator for municipal financial compensation.

Ecosystem

A complex and dynamic interplay between living (biotic) and non-living (abiotic) components, characterized by synergetic interactions within the system and with neighboring ecosystems.

→ Biodiversity, Ecosystem service

Ecosystem service

Direct and indirect contributions of ecosystems to human well-being. Distinctions are currently drawn between provisioning, regulating and cultural services.

→ Biodiversity, Ecosystem

Effectiveness

Measure of operative effect. Describes the degree of target achievement or the ratio of achieved target to defined target, regardless of the expenditure.

→ Efficiency

Efficiency

Measure of profitability. Describes the ratio of the cost of achieving the defined objective to the benefit achieved (cost-benefit ratio). There are two criteria of economic efficiency: Static efficiency means the objective is achieved at the lowest possible cost. In terms of dynamic efficiency, however, the question is whether or not incentives are provided to accelerate the achievement of the objectives so that the goal is reached at a lower cost or exceeded at the same cost. If dynamic efficiency is present, it leads to (further) development of services and institutions and to product and process innovations.

→ Effectiveness

Eingriffs-Ausgleichsregelung (Impact Mitigation Regulation)

Environmental policy instrument in Germany designed to preclude or minimize project-related impacts on nature and landscape and to offset unavoidable impacts through nature conservation measures. The process follows a level check to first distinguish avoidable from unavoidable impacts. Unavoidable adverse effects must be offset through compensation or substitution measures. Compensation measures take place in the spatial and functional context, while substitution measures are usually non-functional, but 'equivalent' measures in the spatial context and only in difficult cases not in the spatial context. The equal status of the two options in the current legislation forms the basis for the

Flächenagenturen (land agencies) in Germany. Any change in the form or use of land that may significantly or permanently affect the performance of the ecosystem or landscape is considered an impact (§§ 14 et seq. BNatSchG).

→ Conservation Bank, Flächenagentur, Habitat Banking, Mitigation Bank, Produktionsintegrierte Kompensationsmaßnahmen (PIK)

Emissions trading

Environmental instrument for reducing pollutant emissions wherever they can be reduced at the lowest possible cost. For this purpose, a maximum total quantity of certain emissions within a specific geographical area and over a certain period of time is determined at the political level. On the basis of this upper limit, certificates or credits are awarded entitling the holder to dispose of a certain quantity of the pollutant. The certificates or credits are then freely tradable, with the price thus being determined market-based by the corresponding demand. (also referred to as cap and trade)

→ Certificate, Credit

Endangered Species Act (ESA)

US law on endangered animal and plant species, the aim of which is to prevent the extinction of endangered species and to conserve the stocks. Any species which is in danger of extinction throughout all or a significant portion of its range is considered to be endangered. Any species which is likely to become an endangered species within the foreseeable future is considered threatened.

European Agricultural Fund for Rural Development (EAFRD)

Fund to promote the development of rural areas in the European Union, through which many incentive programs are funded. The objectives are to improve protection of the environment and animals in the landscape as well as to increase the competitiveness of the agricultural and forestry sector and the quality of life in rural areas through the promotion of innovative regional projects, among other measures. Implemented locally by the member states. In Germany it is the responsibility of the federal states.

→ Agri-environmental schemes, Common Agricultural Policy of the European Union (CAP), Contractual nature conservation

Externalities

Refers to the impact of economic activities (e.g. production or consumption) on third parties, usually not taken into account when economic decisions are made. Negative externalities include all effects harming uninvolved third parties. Positive externalities refer to activities that benefit third parties. (also referred to external effects)

Financier

A stakeholder who pays for the provision of ecosystem services or for the protection and enhancement of biodiversity in a PES but is not the actual beneficiary. Thus the financier is an intermediary who pays on behalf of the beneficiaries (for example, a government stakeholder who finances the conservation and development of biodiversity on behalf of the general public).

→ Supplier, Intermediary, Buyer, Service provider, Customer, Beneficiary

Flächenagentur (land agency)

Service provider between project developers, landowners and land users within the framework of the statutory Eingriffs-Ausgleichsregelung. The Flächenagenturen provide suitable fields (through land purchase, exchange or lease) and develop so-called Flächenpools (land pools) or Ökokonten (green accounts). These fields or the measures implemented there in advance are made available to project developers with compensation obligations. The Flächenagenturen look after the land in the long term and assist in the implementation of the Eingriffs-Ausgleichsregelung.

→ Conservation Bank, Eingriffs-Ausgleichsregelung, Habitat Banking, Mitigation Bank, Produktionsintegrierte Kompensationsmaßnahmen (PIK)

Gray infrastructure

Generic term for roads, rail, water supply, sewer system and other technical infrastructure.

→ Green infrastructure

Green infrastructure

Natural and semi-natural areas with different environmental characteristics that are strategically planned, created and managed with a view to the provision of various ecosystem services. The concept of green infrastructure is meant to encourage conscious consideration of natural processes and ecosystem services in land use planning and territorial development.

→ Gray infrastructure

Habitat

Characterizes the biosphere in which an animal or plant naturally occurs.

Habitat banking

Generic term for environmental/economic tools used to compensate for harmful impacts on nature or certain ecosystems and habitats, that is, in which trade in compensation measures takes place.

→ Conservation Bank, Eingriffs-Ausgleichsregelung, Flächenagentur, Mitigation Bank

Indicator

Proxy for an object or state that cannot be directly observed or that can be measured only at considerable expense. A variable is used that is comparatively easy to measure and has a close and scientifically proven connection with the object or state to be mapped. For example, certain plant species (called indicator species) are used to demonstrate changes in the provision of ecosystem services.

→ Output-based payment

Input-based payment

Payment is made for the implementation of a given management action, not for the measurable change with regard to the provision or enhancement of ecosystem services and biodiversity. (also referred to as measure-oriented payment)

→ Output-based payment

Intermediary

One who supports the emergence of PES by mediating between service providers and beneficiaries in one way or another and ensures the smooth functioning of the exchange of payments in the course of implementation. (also referred to as agent or broker)

→ Beneficiary, Buyer, Customer, Financier, Service provider, Supplier

Intrinsic motivation

The desire or intention to perform a certain action because the action itself is fun, interesting or satisfying. Hence the motivation arises from the action itself. In contrast, extrinsic motivation is fed by external incentives; the idea is to bring about positive consequences or to avoid negative consequences. (also referred to as primary motivation)

→ Crowding out

Invitation to tender

A good or a service is purchased by a contracting agency. The agency defines exactly what it wants to buy and asks bidders for appropriate tenders. The bidders describe what concrete service they can provide and specify at what price they are willing to carry out the necessary measures. The selection among bidders is based on the lowest offers. The term 'reverse auction' is often used in the literature as well. (also referred to as solicitation process)

Landschaftspflegeverband (Landcare Association)

Voluntary alliance of nature conservation, agriculture, and local politics representatives in a non-profit association with the aim of jointly establishing and preserving natural landscapes. The umbrella organization is the German Association for Landcare (DVL) e.V.

Leakage

Occurs when a negative externality is not actually reduced by means of PES but only moved somewhere else. Hence there is no positive net effect on the ecosystem services or biodiversity.

→ Additionality, Conditionality

Mitigation Bank

Banking of the means to offset impacts on wetlands and aquatic ecosystems. The legal basis is the Clean Water Act, which contains specific provisions on compensation for destroyed or degraded wetlands and waters. Wetlands are restored, created and enhanced on permanently protected areas. These activities have to specifically serve as compensation for impacts on wetlands. Project developers committed to undertake compensation measures elsewhere in the course of the approval procedure can fall back on such measures in the form of credits, but only on the measures or credits of a mitigation bank that is located in the same catchment area as the impact. (also referred to as Wetland Mitigation Bank)

→ Conservation Bank, Eingriffs-Ausgleichsregelung, Flächenagentur, Habitat Banking

Models

Computer-based or web-based simulation models that are used in the course of the management of ecosystem services or the development of PES. They make it possible, for example, to make transparent the relationship between specific changes in land use and ecosystem services and are thus important decision-making aids.

→ Ecosystem service, Indicator, Output-based payment

Natura 2000

A coherent network of protected areas to be established within the European Union, based on the areas of the Directive on Flora, Fauna and Habitats and the Birds Directive. The objective is the transnational protection and preservation of wild native animal and plant species and their natural habitats. The Natura 2000 network now covers more than 20 percent of the surface area of the European Union and is the largest protected area network in the world.

→ Birds Directive, Directive on Flora, Fauna and Habitats

No Net Loss Strategy

A European Union initiative to safeguard the current state of nature and landscape and especially biodiversity: A net loss of biodiversity is to be avoided in any activities that have an impact on nature.

→ Biodiversity

Opportunity cost

Loss of benefit or revenue, expressed in terms of the cost that would have been incurred if an alternative way of using a resource had been chosen (e.g. the intensive cultivation of a piece of land instead of letting it lie fallow). (also referred to as alternative cost or waiver cost)

→ Production cost, Transaction cost

Output-based payment

Links payment under a PES to a measurable environmental condition clearly defined prior to implementation. This condition can be measured directly or mapped with the aid of indicators and models. (also referred to as performance-based payment or result-oriented)

→ Indicator, Input-based payment, Models

Payment for ecosystem services (PES)

As defined in this book, land users are paid within the framework of PES for reducing the allowed negative external effects on ecosystem services or taking action to protect, provide or enhance ecosystem services and biodiversity.

Production cost

Sums that must be expended to produce a good or provide a service. This cost generally consists of material and production costs.

→ Opportunity cost, Transaction cost

Produktionsintegrierte Kompensationsmaßnahmen (PIK, production-integrated compensation measures)

New approach in the context of the Eingriffs-Ausgleichsregelung. Compensation measures are implemented on agricultural land that is enhanced through temporary, rotating and precisely defined activities of the managing farmer for the protection of biotic or abiotic resources. Agricultural lands previously used intensively are ecologically enhanced, but are still retained as agricultural production areas.

→ Eingriffs-Ausgleichsregelung, Flächenagentur

Public good

A good or a service that is used at one and the same time by various stakeholders, since no one can be excluded from its use (non-excludable). There is no rivalry between the beneficiaries, however, since consumption by one does not preclude consumption by another (non-rivalrous). If a good is both non-excludable and non-rivalrous, it is a pure public good. Impure public goods or common goods, however, meet these criteria only in part.

→ Common good

Restoration

Renaturing of formerly natural or semi-natural habitats that have been modified greatly through human intervention.

Service provider

A stakeholder who contributes directly through his activities to the conservation and provision of ecosystem services or to the enhancement of biodiversity and is paid for it within the PES framework.

→ Beneficiary, Buyer, Customer, Financier, Intermediary, Supplier

Social entrepreneurship

Entrepreneurial activity aimed at the solution of social problems, in our case of environmental problems. Profit is not a major consideration.

Social obligation

In Germany, everyone is entitled to have their private property protected. However, the use of property has to serve the general public or at least not be against the public interest (Art. 14 Para 2 of the Basic Law, Property entails a social obligation). For the environmental sector, this means that under certain conditions landowners in nature conservation areas, for example, have to accept restrictions on their rights of use (e.g. in relation to agricultural activities) without financial compensation.

Supplier

A stakeholder who offers to protect and provide or enhance ecosystem services and biodiversity within the PES framework. In this book the term is also used for an intermediary on the supply side who as the immediate contact and contracting party for buyer or financier acts on behalf of several service providers.

→ Beneficiary, Buyer, Customer, Financier, Intermediary, Service provider

Transaction costs

All costs occasioned by a transaction between stakeholders on the basis of the exchange of a performance, that is, search and information-gathering costs, the cost of negotiation, decision-making, hedging, settlement and agreement and the cost of enforcement, control, evaluation and adjustment.

→ Opportunity cost, Production cost

Water Framework Directive

European Union directive standardizing the legal framework for the protection of surface, coastal and transitional waters and groundwater (Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy). Its aim is to prevent or to reduce the pollution of the waters, to promote the sustainable use of water,

to improve the condition of aquatic ecosystems and to mitigate the effects of floods and droughts. To that end, all waters within the European Community are to be in good ecological and chemical condition by 2015.

→ Clean Water Act (CWA)

Below we have listed a few sources and websites that we recommend for further reading in relation to the issues raised.

I. ON THE SUBJECT OF ECOSYSTEM SERVICES

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Paying for Green?

Payments for Ecosystem Services in Practice. Successful examples of PES from Germany, the United Kingdom and the United States.

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- the conference “Towards ,the big environmental society?“, Cardiff 2011 (<http://cardiff.civiland-zalf.org/>).
- the international conference on “Payments for Ecosystem Services and their Institutional Dimensions“, Berlin 2011 (<http://pes-conference.civiland-zalf.org/>).
- the expert workshops on “PES: MAKING IT WORK - Actors and Factors Influencing the Success of PES“, Vermont 2012 and “Instrumente zur Honorierung von Ökosystemleistungen: Was macht sie erfolgreich?“, Berlin 2012 (<http://www.civiland-zalf.org/tagungen/>)

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“The biggest thing of having a successful PES scheme is trust on both directions. You need to understand each other’s business, learn to trust each other and work as a partnership instead of a contractor.”

Laurence Couldrick from Westcountry Rivers Trust, United Kingdom

A multitude of tools are employed in attempts to counter the growing environmental problems. Among these are Payments for Ecosystem Services, or PES for short. Under this heading, programs and projects are discussed whereby farmers and foresters in particular are rewarded for providing ecosystem services. There is a great deal of interest in the worlds of politics and science.



This book presents 19 successful examples of PES from Germany, the United Kingdom and the United States supplemented by personal interviews with the developers and coordinators. It provides information about their various objectives, payment mechanisms, funding concepts and stakeholders as well as about existing problems and future prospects. The book also addresses the theoretical backgrounds of PES as well as the challenges that are to be observed with regard to the development and implementation of the tool.

The book is aimed at a wide readership: conservationists, government officials, policy makers, students and interested individuals. It shows where the potentials and opportunities as well as the limits of PES lie. Against this background, the authors argue in favor of critical use of the tool and urge further development of the potential of PES in conjunction with other environmental control strategies.



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