Targeted woodland creation, the restoration and conservation of forests and riparian buffers, as well as use of other forms of natural infrastructure can help in achieving policy targets related to water quality, water supply and flood risk reduction, and other goals. This session aims to explore the effectiveness of measures involving trees and other natural infrastructure in helping meet water-related policy targets and Sustainable Development Goals, and the cost-effectiveness of associated Payment for Ecosystem Services schemes. This session is organised by the Payments for Ecosystem Services (Forests for water) COST Action (PESFOR-W) in conjunction with the Boticário Group Foundation and Ibá.

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**E9a**

**Assessing the environmental effectiveness, design and governance, and cost-effectiveness of Woodlands for Water Payments for Ecosystem Services schemes: activities, findings and ambitions of the PESFOR-W COST Action**

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**Abstract**

The PESFOR-W EU COST Action (15206) is a network of researchers and practitioners from 40 countries interested in the effectiveness of woodland measures in reducing agricultural diffuse pollution to watercourses, and the design and governance and cost-effectiveness of woodlands for water payments for ecosystem services (PES) schemes.

Diffuse pollution from agriculture is a significant pressure affecting over 40% of Europe’s river and coastal water bodies. Accumulating evidence indicates that the EU Water Framework Directive’s objective that each water body reaches “Good Ecological Status” by 2027 in many cases will only be achieved by targeted land use change. Small-scale forest planting
(“Woodlands-for-water”) is a potential solution to this problem.

To help underpin future development of woodlands for water projects, PESFOR-W is creating ‘look-up’ tables on the effectiveness of woodland creation for reducing a number of key diffuse pollutants. An initial evidence review found that woodlands buffers reduce nitrate concentrations by over 70% on average in both oceanic and Continental climates, with the strength of effect strongly related to buffer width.

PESFOR-W is developing a common protocol for assessing the cost-effectiveness of woodlands for water PES, creating a spatial repository of case studies, and will develop guidance on development of new schemes. It is exploring the potential for creating a Woodland Water Code along similar lines to the Woodland Carbon Code developed for the carbon benefits of woodland creation projects in the UK, and for linking with existing schemes covering other woodland benefits to help achieve wider goals of the carbon-water policy nexus.
Assesing of payments for forest ecosystem services - Slovak examples related to water

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Abstract

The aim of the paper is to analyse main approaches and types of payments for forest ecosystem services (PFES) mechanisms or financial arrangements related to water with the emphasis on three basic schemes: (i) public or government-financed PFES, (ii) private or user-financed PFES, and (iii) public-private schemes. The main classification of PFES schemes was based on Wunder’s (2005) 5 criteria. The empirical part was based on the review of PFES schemes implemented in different Forest Europe signatory countries. The personal interviews with actors presented as ES providers were used to describe the main features of PFES schemes on chosen examples from Slovakia. The results pointed out, that only a few “core” PES schemes are applied in Europe that usually have a mixed public-private character. In Slovakia three types of public PFES schemes were identified: 1) forest land tax relief for protective and special purposes forests, 2) refunds for the restriction of ownership rights and 3) Forestry Support for non-productive forest functions, which are public schemes. Private PFES scheme related to the provision of drinking water for local use has been identified so far. In this case the “Piggy-backing” principle is applied where a single service generated from the water managing authority (Military Forests and Estates of the Slovak Republic, that provides water management in accordance with area needs and environmental regulations) is sold to one specific buyer (local water management and supply company, that manages and maintains forest land and is responsible for land improvements and stream dikes).
Incorporating agroforestry into water quality trading: evaluating economic-environmental tradeoffs

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Abstract

Water quality trading (WQT) holds promise as a flexible policy approach to reduce agricultural nutrient pollution by encouraging the adoption of best management practices (BMPs). WQT can theoretically achieve water quality improvements at least cost, but its ability to do so in practice depends on how tradable credits are awarded. Ideally, crediting should reflect heterogeneity in water quality improvements under alternative management practices. However, because it is challenging to quantify the environmental outcomes associated with different BMPs, WQT programs often award uniform credit allocations to practices that deliver different water quality improvements.

In the Chesapeake Bay Watershed of Virginia, USA, we estimate the water quality benefits and economic costs of a suite of alternative BMPs, including land retirement, forestry, and agroforestry practices (e.g., multi-zone riparian buffers and alley cropping). We implement a biophysical mass-balance model to quantify the marginal environmental benefits of each BMP in terms of reduced nutrient runoff. We couple this biophysical model with an economic model of the marginal costs associated with each practice to examine the tradeoffs between economic and environmental outcomes. We present evidence of significant heterogeneity in water quality benefits across BMPs and demonstrate that efficiency gains are possible with differentiated water quality crediting. Moreover, we find that the status quo uniform approach to crediting undervalues the water quality benefits of agroforestry practices, dampening farmers’ incentives to adopt these systems. The economic-environmental approach presented here offers a practical approach to designing WQT policies that are both economically sound and biophysically grounded.
EVALUATING WILLINGNESS TO PAY FOR WATERSHED PROTECTION IN THIKA DAM, MURANG’A COUNTY: Case of Nature based solution to water challenges in Kenya

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Abstract

Payment for Environmental Services is an incentive based approach in natural resource management aimed at linking the suppliers and consumers of goods and services from a natural resource in a way that both parties contribute to improved delivery. Nairobi City has experienced serious water shortages in the past due to water levels in Thika dam subsiding to low levels and resulting in water rationing. The dam supplies 80% of water to Nairobi city but few of the residents are able to link availability of clean water in their pipes to conservation of water catchments areas. The objective of the study was to find out whether users of water from Thika dam could participate in watershed protection scheme through Payment for Water Services. The study identified factors that could influence willingness of water users to pay for the environment services. Primary and secondary data were collected based on baseline survey and qualitative research approaches, interview schedules, questionnaires and, focus group discussions. Results showed that 83% of farmers are willing to participate in scheme aimed at improving conservation. There was significant relationship between farmer’s source of water and amount of money they could give but attached condition of clean and regular water. Rewards in kind were more preferred. There was no framework in which consumers willing to pay could use to provide incentives to the providers of environment services. The government could make use of the findings of the study to develop a nature-based payment model for Nairobi residents.
Consequences of Mexico’s Payment for Hydrological Services program for ecosystem service and economic trade-offs: an integrated field and modeling approach

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Abstract

Payment for Watershed Hydrological programs (PHS) are increasingly used worldwide as a policy tool to provide incentives for upstream landowners to adopt land use activities favoring sustainable provision of high quality water to downstream areas. Because PHS operate at the interface between human and biophysical systems, complex and often unexpected interactions often occur, yet knowledge about how these interactions affect ecosystem services and economic outcomes is currently lacking. We assessed the ecosystem service and economic tradeoffs of Mexico’s PHS program in two watersheds in Veracruz, Mexico. We found strong consistencies between provisioning of different ecosystem services (i.e., water quality and quantity, carbon storage, and biodiversity) across land uses, such that provisioning for one service allowed for greater provisioning of another. Further, we found that conversion of primary forests to other land uses (i.e., coffee, sugarcane, pasture) would result in net decreases in ecosystem service provisioning, with the exception of young forests. All forest land uses had much greater ecosystem service benefits than other land uses but the specific provisioning of each land use to ecosystem services varied in unexpected ways. Additionally, many PHS participants (30%) indicated that PHS did not provide significant income benefits, and a majority highlighted that their motivations for participation included not only financial benefits, but also other factors such as environmental stewardship and community benefits. Current efforts focus on integrating these data into a modeling framework to assess the consequences of different PHS policy and land use change scenarios for watershed sustainability.
Transaction and implementation costs and the environmental effectiveness of the Water Producer Programme (Brazil)

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Abstract

This paper studies the economic impacts and the environmental effectiveness of a large-scale public investment in the Water Producer Program (WPP) in the Pipiripau River Basin in Brasília, Brazil. The WPP is a voluntary payment for ecosystem services (PES) program aimed to improve the quality and quantity of water via three types of actions: (i) soil conservation, (ii) restoration or conservation of areas under permanent protection and/or legal reserves, and (iii) conservation of native vegetation remnants. All three actions are required for landowners to be eligible for payment. However, contract signatories bear no costs of implementation - all works and services are offered free of charge to landowners. This incentive scheme deviates largely from the willingness-to-pay approaches predominant in the literature. Created in January 2012, the WPP is still in its implementation phase and there are questions as to its attractiveness and effectiveness. In this paper we develop a model of a PES program in which landowners are given traditional incentive schemes to enroll in the program, as well as subsidized implementation costs. We evaluate the effectiveness of the incentive scheme for enrollment and expected returns from ecosystem services. We complement the model with an empirical analysis of the WPP. We find that since the implementation of the WPP in 2012, over 350,000 seedlings of native trees were replanted in participating properties and over 200 ha of additional land are undergoing restoration. We find evidence of reductions in the cost of water treatment over the course of the study.
The Stick and the Carrot: Explaining the decision to participate in the Water Producer Programme (Brazil)

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Abstract

In 2012 the Brazilian Government set up the Water Producer Programme (WPP) in the Pipiripau River Basin (Federal District). WPP is a voluntary membership programme focused in stimulating the protection of water resources and reducing damages from soil erosion through a policy of Payment for Environmental Services (PES). Since the creation of WPP roughly half of the landowners in the basin have joined the Programme. A non-negligible number of owners, however, have decided not to join. We interviewed landowners in the area covered by WPP to find out more about their motivation to join the programme. We conducted econometric analyses based on (i) observed participation to WPP and (ii) their compliance with the Brazilian Forest Code (BFC). A non-spatial probit model and both spatial binary probit models spatial auto-regressive (SAR) and spatial error (SEM) were used to explain the decision of landowners to participate. We found that programme’s benefits (carrot-like incentives) alone were not strong enough to attract owners to join WPP as owners already complying with BFC have a much low participation rate. On the contrary, carrot-like incentives together with stick-like incentives greatly improved participation. This last result shows how important it is for landowners to sign the contract for fear to be punished by the BFC and in order to avoid regularisation costs, rather than for the programme’s objectives and their own pro-environment values.
Manejo Hidrossolidário de Florestas Plantadas

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Abstract

Todas as organizações têm procedimentos e rotinas que são necessárias para que os objetivos estabelecidos sejam alcançados, no entanto, esses padrões podem se tornar obstáculos para chegada de novas ideias. Estas devem ser embasadas em parâmetros técnicos e critérios relevantes para incorporação no manejo florestal, aperfeiçoando aspectos no âmbito econômico, ambiental e social. A operação de colheita é tida como item de destaque no processo produtivo, sendo determinada pela sequência de corte de talhões com bom rendimento operacional, que está diretamente ligado ao tamanho dos blocos e dispersão dos talhões, contribuindo para redução dos custos operacionais e deslocamento das frentes de trabalho. Para isso, diversos fatores devem ser considerados no momento do sequenciamento de corte, como produtividade das florestas, gênero plantado e distribuição espacial dos talhões. A mudança conceitual realizada foi a inserção do conceito de hidrossolidariedade no planejamento florestal, guiando a tomada de decisão das operações. Entende-se que o tamanho dos blocos de colheita pode acarretar prejuízos aos processos hidrológicos e à conservação da biodiversidade. Para compatibilizar os interesses foram avaliadas todas as microbacias de terceira ordem sob a influência das áreas plantadas e estabeleceu-se uma regra que propõem que pelo menos 40% da cobertura vegetal da microbacia seja mantida enquanto os outros 60% sejam manejados.
The forest based industry and SDGs most linked to water resources

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Abstract

Water is an essential resource for any productive chain and its availability in terms of quality and volume has been significantly affected by a set of issues including climate change, increasing population and demand of resources and products, besides land use management amounts others. This session aims to show the ecosystem services related do water resources, including services on regulation, provision, support and culture. Additionally, the session aims to show the contribution of forest based industry in Agenda 2030 (Sustainable Development Goals) considering primarily the role of forestry and the forest-based industry on water resources. It seeks to present challenges that should be better addressed by private sector, academy, policy makers and civil society towards a better water resource management; and to propose solutions to promote and scale up good water management as an environmental service adding value to large scale producers, but particularly smallholders.