

PROLINE-CE WORKPACKAGE T3, ACTIVITY T3.1

DEVELOPMENT OF MEASURES AND FUNDING SYSTEMS FOR SUPPORTING ECOSYSTEM SERVICES

D.T3.1.2 CATALOGUE OF MEASURES AND POSSIBILITIES FOR FUNDING ECOSYSTEM SERVICES

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Abstract

D.T3.1.2 "Catalogue of measures and possibilities for funding ecosystem services" aims to collect and analyse, drawing on country-specific experiences, potential measures and possibilities of funding ecosystem services which are compliant with the protection of drinking water and for flood/drought management, both in terms of water quality and quantity. Starting from the transnational catalogue of Best Management Practices (BMPs) identified in DT1.2.2. and mainly driven by D.T3.1.1 concerning hydrologic services provided by different ecosystems over the CE domain, DT3.1.2 will provide support for national, regional and local agencies as well as private water users in the idenfication of suitable opportunities and funding schemes available to financially support the implementation of BMPs and enhance ecosystems providing relevant hydrological services in their pilots.

Introduction

As described in D.3.1.1 different kind of hydrologic services are provided by different ecosystems over the CE domain that are particulary relevant to ensure drinking water protection and flood management, both in terms of water quality and quantity. Accordingly, policies need to be established to protect such natural ecosystems and guarantee the services they provide on a long term base. Among different environmental and natural conservation policies and instruments economic mechanisms and incentives (e.g. payments for ecosystem services (PES)) are becoming particularly popular in recent years. The novelty of these economic mechanisms, respect to traditional conservation policies, arises from its focus on the "beneficiary pays principle", as opposed to the "polluter pays principle". The basic idea behind them is that those who provide ecosystem services - like any service - should be paid for doing so. Accordingly, PES are financial instruments through which beneficiaries of ecosystem services reward providers through economic incentives to compensate them for implementing good land management, including conservation activities. Such compensation encourages them to "voluntarily" provide (or continue providing) such services, instead of monetizing their "natural capital" otherwise. These schemes can provide a new source of income for land management, restoration, conservation, and sustainable use activities, and thus have significant potential to promote sustainable ecosystem management. The key characteristic of these PES deals is that the focus is on maintaining a flow of a specified service – such as clean water, biodiversity habitat, or flood protection capabilities - in exchange for something of economic value which can include both monetary and nonmonetary transactions. Some PES transactions provide other forms of compensation for ecosystem services, such as strengthened property rights or temporary permission to actively manage the ecosystem involved.

In literature there is no formal definition of PES which is often used as an umbrella term for the entire suite of economic arrangements used to reward the conservation of ecosystem services. For the purpose of this report, however, we will adopt the definition proposed by Wunder (2005) which is commonly accepted and described PES based on five simple criteria which defined them as a: "a voluntary transaction where (ii) a well-defined ecosystem service (or a land-use likely to secure that service) (iii) is being 'bought' by a (minimum one) ecosystem service buyer (iv) from a (minimum one) ecosystem service provider (v) if and only if the ecosystem service provider secures ecosystem services provision".

First, PES is a voluntary, negotiated framework, which distinguishes it from command-and controlmeasures. Moreover, payments are made for actions and good practices over and above those which land or resource





managers would generally be expected to undertake or defined by the legal and normative frame of each country.

Secondly, what is bought needs to be well defined— it can be a directly measurable service (e.g. additional tons of carbon stored) or land-use caps that are likely to help providing that service (e.g. forest conservation increase water availability). Then in any PES, there should be resources going from at least one ES buyer to at least one provider, though the transfer often occurs through an intermediary. Last but not least, in a PES scheme user payment need to be truly contingent upon the service being continuously provided. ES buyers thus normally monitor compliance (e.g. deforestation or slash-and-burn agriculture really been contained in the manner stipulated in a given contract, ecosystem services provision objectives achieved).

Different PES schemes stems from different economic domain, financial arrangements, socio-economic context which however can be broadly summarized/reconducted in the following three main typologies (Smith et al., 2006):

- Public schemes or government-financed PES, which involve a government agency, or another public institution providing direct payments and subsidies to landowners to steward and manage their land in ways that will generate or enhance ecosystem services including user fees, land purchase and granting of rights to use land resources as well as fiscal mechanisms based on taxes breaks and subsidies (e.g. CAP). Payments may be standardized or negotiated individually. This form of payment for ecosystem services is the most common.
- <u>Private schemes or User-driven PES</u>, which are self-organized private deals in which ecosystem services users or beneficiaries (i.e. water utilities, companies, firms) directly pay landowner or other parties to conserve, restore and deliver the services. Users may be individuals, companies, nongovernmental organizations (NGOs) or public actors that are direct beneficiaries of ecosystem services protection, enhancement or re-establishment.
- <u>Trading schemes and offsets</u>, which occur where compensation for the provision of an environmental service comes from funds generated in markets in which environmental permits, quotas or other rights can be exchanged. Parties facing regulatory obligations compensate other parties for activities that maintain or enhance comparable ecosystem services or goods in exchange for a standardized credit or offset that satisfies their mitigation requirements. Examples include water quality trading and wetlands mitigation banking.

Given the broad range of PES approaches, some schemes do not fit neatly into these categories and represent a hybrid approach.

According with the aforemetioned definition and classification in Section 1 different kind of funding opportunities supporting the implementation of PES schemes available and already implemented and applied at EU level have been identified based on literature review and described in term of their financial source, their mechanism, the type of activities funded and thus the type of ecosystem services potentially enhanced and the type of land use. In line with the specific objectives of PROLINE-CE, only measures financing ESs related with drinking water protection and flood control have been analyzed. Different funding opportunities





have been linked with specific ESs based on DT3.1.1 and with some of the best practices (BMPs) consistent with the DT1.2.2. In this way, the catalogue has the final function of support national, regional and local agencies as well as private water users in the idenfication of suitable opportunities and funding available to financially support the implementation of BMPs in their pilots. Based on project partners' contributions it was also possibile to analyse and monitor the application of different kind of PES schemes at national level across CE which are presented in Section 2 and to link them with site specific measures in national PAs (Section 3)

1. Catalogue of funding possibilities EU

Section 1 presents a catalogue of available funding opportunities at Europen level to support the implementation of PES schemes identified based on literature review and partners' contributions.

Measure 1			
Agri-environmental-climate payments			
Financial source			
European Agricultural Fund for Rural Development (E	AFRD)		
Description/how it works			
Agri-environment measures are designed to encourage farmers to protect and enhance the environment on their farmland. It provides for payments in form of subsidies to farmers in return for a service - that of carrying out agri-environmental commitments that involve more than the application of usual good farming practice. Farmers commit themselves voluntarily , for 5 to 7 years , to adopt environmentally friendly farming techniques that go beyond legal obligations . Payments are based on the income foregone for the beneficiary in order to perform the action needed, plus additional costs incurred. For certain measures, opportunity costs are also taken into account in the calculation. Agri-environment payments are co-financed by the EU up to a percentage depending on the type of measure and the rest provided by member state budget or/and private sources. The actions implemented need to be explicitly defined, monitored and controlled. Payments can only cover commitments that go beyond other existing mandatory requirements for farmers, i.e. cross-compliance (Statutory Management Requirements (SMR) and standards of Good Agricultural and Environmental Condition (GAEC)), the requirements of the greening measures, relevant requirements for fertiliser and plant protection product use and any other			
Examples of activities funded	Relation with Best Management Practices (BMPs)		
 Preservation of landscape and historical features such as hedgerows, ditches and woods; Management of low-intensity pasture systems; Cultivation practices that support soil quality (anti-erosion, leaching); Conservation of high-value habitats and their associated biodiversity. 	BP MA7 Encouraging organic farming; BP MA9 Increasing the efficient use of water in agriculture and adapting to climate change; BP MA10 Soil erosion prevention and increasing of soil fertility and soil organic matter; BP MA12 Maintenance of water, soil and air quality in agriculture; BP MA15 Soil management; BP MA17 Maintenance of terraced agricultural areas; BP PA2 Planting/Maintenance of areas as green fallow when soil quality is low (Ackerzahl < 30); BP PA3 Filter strips along permanent streams; BP PF6 Establishment of agro-forestry systems (grazing) and wood-pastures.		
Ecosystem services potentially enhanced			
Improvement of water supply;Securing water quality.			





Land use/clus	Land use/cluster							
 Agricultura 	l used ecosyster	n;						
 Grassland i 	n plains.							
Applied by								
Austria Germany Croatia Hungary Italy Poland Slovenia								

Measure 2

Natura 2000 and Water Framework Directive payments

Financial source

EU funding instruments-European Agricultural Fund for Rural Development (EAFRD)

Description/how it works

The Natura 2000 and Water Framework Directive payments provide annual per hectare compensation payments to farmers and forest owners for the additional costs and income foregone when implementing the Birds and Habitats Directives or (for farmers only) the Water Framework Directive. The Measure is designed to compensate farmers and foresters for the disadvantages they face as a result of mandatory activities they carry out as a result of the legal requirements set out under these directives, compared to the situation of farmers and foresters in other areas not affected by these requirements. The Natura 2000 payments are applicable to agricultural or forestry land in Natura 2000 areas, which include Special Protection Areas (SPA), designated under the Birds Directive and areas of Special Conservation Interest, or Special Areas of Conservation (SAC), designated under the Habitats Directive. Payments can also be made to other specified nature protection areas which have been identified because they contribute to maintaining the connectivity of the Natura 2000 network and its habitats and specific species. The Water Framework Directive payments are relevant to measures defined in river basin management plans (RBMPs) that affect the use of agricultural land. Support can be granted to farmers and to private forest holders and associations of private forest holders. In duly justified cases it may also be granted to other land managers. Water Framework Directive payments support can only be granted in relation to specific requirements that go beyond the statutory management requirements, the Good Agricultural and Environmental Condition (GAEC) standards set by the Member State or region, and the minimum agricultural activity requirements. The Natura 2000 payments can only be granted in relation to specific requirements that go beyond the GAEC and minimum agricultural activity requirements but are not subject to the statutory management requirements. Good Agricultural and Environmental Condition standards set minimum conditions that farmers in receipt of CAP payments must meet on all agricultural land including standards to protect water (e.g. establishment of riparian buffer strips), soil and carbon stock (e.g. minimum soil cover, minimum management to limit erosion, and practices to maintain soil organic matter), and landscape (protection of landscape features).

Examples of Activities funded	Relation with Best Management Practices (BMPs)
Activities aiming at the conservation of high-value	BP MF26 Investments in forest area development
habitats in the Nature 2000 area and their	and improvement of the viability of forests;
associated biodiversity (e.g. restrictions on wood-	BP MF38 Pro Silva movement;
cutting, cork harvesting and livestock grazing	BP PF6 Establishment of agro-forestry systems
creation and maintenance of grass cover and	(grazing) and wood-pastures;
vegetation with fauna and flora interesting	BP M(P)G3 Supporting guidance for creation of low-
peatland conservation).	input grassland to convert arable land at risk of
	erosion or flooding;
	BP MG25 Sustainable production (no over-mowing
	and promoting self-regeneration processes);
	BP PW3 Natural management of wetlands
	BP M(P)A8 Advisory services, farm management and
	farm relief services;
	BP SR9 Implementation of the Technical regulations
	for the maintenance of natural and artificial





			watercourses in the RN2000 sites; BP FM9 Protective forest management c floodplain.				
Ecosystem server	vices potential	ly enhanced					
 Improve Water f Securin 	ement of water flood damage m g water quality	supply; itigation;					
Land use/clust	er						
 Agricultural used ecosystem; Forest ecosystems; Grassland in plains; Wetland ecosystems. 							
Applied by							
Austria	Germany	Croatia	Hungary	Italy	Poland	Slovenia	

Measure 3				
Investments in forest area development and improvement of the viability of forests				
Financial source				
EU funding instruments - European Agricultural Fund	for Rural Development (EAFRD)			
Description/how it works				
The measure covers all types of support for forestry investments and management, with a view of helping beneficiaries to realize integrated investments in forest areas with increased added value including ecosystem services provisioning. The payment covers the costs of establishment of the afforestation/creation of woodland or the agro-forestry system and an annual premium per hectare to compensate for the agricultural income foregone and for maintenance costs, including early and late cleanings. Support can be granted for a maximum period of five years in case of agro-forestry system creation up to a maximum period of twelve years for afforestation/creation of woodland activities. Support can be granted either to public and private land-holders or land holder associations. In the case of state-owned land, support can only be granted if the body managing such land is a private body or a				
Challenges for implementation				
Quite specific activities and eligibility criteria to be met by Member States (e.g. determine the minimum and maximum number of trees per hectare taking account of local pedo-climatic and environmental conditions, define the relevant tree species to be planted taking into account the need for resilience to climate change and natural disasters, the potential invasive character and the local conditions of the afforected area)				
Examples of Activities funded	Relation with Best Management Practices (BMPs)			
 Afforestation and creation of woodland; Establishment of agroforestry systems; Prevention and restoration of damage to forests from forest fires and natural disasters, including pest and disease outbreaks, catastrophic events and climate related threats; Investments improving the resilience and environmental value as well as the mitigation potential of forest ecosystems. 	All of BP MF and PF, in particularly: BP MF2 Establishment of a Continuous Cover Forest System; BP MF5 Continuous Regeneration Dynamics; BP MF6 Foster Stability, Vitality and Resilience of the Forest Ecosystems; BP MF7 Tree Species Diversity According to the Natural Forest Community; BP MF19 Forest Fire Prevention; BP MF25 Sustainable forest management and establishment of protective forests; BP PF1 Forest conversion from monoculture to mixed forest; BP PF4 Protective forest management and			





afforestation of DWPA.						
Ecosystem ser	vices potential	ly enhanced				
 Improvement 	nt of water supp	oly;				
 Water flood 	l damage mitiga	tion;				
 Securing wat 	ter quality.					
Land use/clust	er					
 Forest 	ecosystems;					
 Grassla 	and in plains;					
 Agricul 	tural used ecosy	/stem;				
Applied by						
Austria Germany Croatia Hungary Italy Poland Slovenia						

Measure	4

Environmental, nature conservation and climate action programmes -LIFE				
Financial source				
EU funding instruments (LIFE Programme)				
Description/how it works				
LIFE Programme is the EU's funding instrument for the environment and climate action. The current phase of the LIFE Programme (2018-2020) co-finance nature conservation, environmental and climate action projects. The 'Environment' strand of the new programme covers three priority areas: environment and resource efficiency; nature and biodiversity; and environmental governance and information. The 'Climate Action' strand covers climate change mitigation; climate change adaptation; and climate governance and information. The general objective of LIFE is to contribute to the implementation, updating and development of EU environmental and climate policy and legislation by co-financing projects with European added value. The LIFE Multiannual Work Programme 2018-2020 (MAWP 2018-2020) sets out the general objectives of the LIFE Programme, the types of projects aimed for and the associated budgets. Calls for Proposals are issued for each of the years 2018, 2019 and 2020 in which the EU Commission invites applicants to submit proposals for LIFE Action Grant awards . The eligibility criteria for the different project types are detailed in the MAWP 2018-2020 and the application guidelines published alongside each call. The maximum rate of EU co-financing under LIFE is usually set at 55% of eligible costs, 60% of eligible costs in the case of projects in the Nature & Biodiversity priority area, 75% of eligible costs for projects that concern priority habitats or species as defined in the Habitats (92/43/EEC) or the Birds Directives (2009/147/EC). Small and Medium Enterprises (SMEs), Large and medium sized corporates, Non-Government				
Example of Activities funded	Relation with Best Management Practices (BMPs)			
 Typical actions under ongoing LIFE+ Nature and Biodiversity projects include, for instance: development and application of Green Infrastructure restoration projects to improve the structural diversity of forests; starting forest-environment schemes by means of demonstration and best practice projects. 	BP PW3 Natural management of wetlands; BP MA13 Optimized application of phytosanitary products; BP MA14 Reducing runoff of phytosanitary products and fertilizers; BP SD2 Promote integrated ecosystem-based solutions of natural water retention measures; BP SR5 Integrated hydraulic-environmental restoration of water streams within the piedmont belt; BP SR6 Naturalistic restoration for the integrated hydraulic-environmental sustainability of the canals; BP SR8 Guidelines for integrated rehabilitation of drainage canals;			





		BP SR10 Guidelines for programming and implementation of maintenance operations on vegetation and riparian forests; BP SR11 Wooded Buffer Strips in rural areas; BP FM12 Preventing flooding risk by making resilient communities.				
Ecosystem services pot	entially enhanced					
 Improvement of 	water supply;					
 Water flood dan 	nage mitigation;					
 Securing water of 	quality.					
Land use/cluster	Land use/cluster					
 Agricultural use 	 Agricultural used ecosystem; 					
 Forest ecosyster 	ns;					
 Grassland in pla 	ins;					
 Wetland ecosystems. 						
Applied by						
Austria Germany Croatia Hungary Italy Poland Slovenia						

Measure 5
User-driven watershed Investments
Financial source
Private
Description/how it works

With this type of measure, **payments** are made from private **water users (i.e. companies, water utilities) acting on behalf of costumers, to landholders or other parties** in exchange for **conserving, restoring, or creating green infrastructure to protect and manage water sources**. Buyers may contact directly sellers in a process known as **bilateral agreements** for watershed protection or pay into a collective action fund/water fund that pools contributions for greater impact. User-driven programmes can be voluntary or a mechanism to meet regulatory compliance.

Private sector buyers, however, are usually driven by reputational concerns, as well as the desire to manage water-related risks to their supply chains and operations while water utilities are more likely to be motivated by compliance or cost-savings opportunities. Examples of these programmes are initiatives funded by Coca-Cola and Nestlè Waters to replenish water use impacts of their activities also spanned across borders. Other examples more at local scale are efforts of the Mutti S.p.A. company, one of the largest producers of industrial tomato in Italy, to promote water saving technologies for irrigation and reduce the water footprint of the whole production chain (https://www.mutti-parma.com/en/about-mutti/our-social-responsibility)"

Examples of activities funded	Relation with Best Management Practices (BMPs)
 Forest conservation; 	BP MA7 Encouraging organic farming;
 Forests restoration or enhancement; 	BP MA9 Increasing the efficient use of water in
 Wetland restoration or enhancement; 	agriculture and adapting to climate change;
 Agricultural or pastoral sustainable 	BP MA12 Maintenance of water, soil and air quality
management;	in agriculture;
 Grassland conservation. 	BP MA15 Soil management;
	BP MF26 Investments in forest area development
	and improvement of the viability of forests;
	BP M(P)G3 Supporting guidance for creation of low-
	input grassland to convert arable land at risk of
	erosion or flooding;
	BP PW3 Natural management of wetlands;
	BP SR9 Implementation of the Technical regulations





for the maintenance of natural and artific watercourses in the RN2000 sites; BP FM9 Protective forest management on floodpla				
Ecosystem services potentially enhanced				
 Improvement of water supply; Securing water quality. 				
Land use/cluster				
 Agricultural used ecosystem; Forest ecosystems; Grassland in plains; Wetland ecosystems. 				
Applied by				
Austria Germany Croatia Hu	ngary Italy Poland Slovenia			

Measure 6	
Natural Capital Financing Facility (NCFF)	
Financial source	
European Investment Bank (EIB)	
Description/how it works	
Under the Natural Capital Financing Facility (NCFF) and investments in funds to support projects wh including adaptation to climate change, in the Memb the following themes: projects involving payments for the flows of	, the European Investment Bank (EIB) provide loans nich promote the preservation of natural capital, er States. The NCFF will support projects working on of benefits resulting from natural capital. They are
 based on the beneficiary pays principle: the for securing that service. projects generating revenues or saving costs 	beneficiary of an ecosystem service pays the provider based on the provision of goods and services such as
water management, air quality, forestry, re consequences of climate change	creation, pollination and increased resilience to the
 biodiversity offsets or conservation actions in harm to biodiversity caused by development 	projects.
To be eligible for the NCFF financing, a project management of ecosystems, including through ecosy economic benefits, including the ability to gener exceeding costs; iii) contribute to the objectives of and/or climate adaptation. Recipients of the NCFF fr public authorities, land owners and businesses as w Non-Governmental Organizations.	must i) promote the conservation, restoration and ystem-based solutions; ii) demonstrate financial and ate revenues or save costs, with overall benefits the EU LIFE programme for nature and biodiversity, inancing can be public and private entities, including rell as private non-commercial organizations such as
Examples of Activities funded	Relation with Best Management Practices (BMPs)
 Creation of green corridors; 	BP MF2 Establishment of a Continuous Cover Forest
 Nature-based flood protection measures; 	System;
 Creation of retention basins; 	BP MF3 Defined Crown Cover Percentage of Forest
 Re-naturalization of rivers and wetlands. 	BP MF6 Foster Stability, Vitality and Resilience of the Forest Ecosystems
	BP MF14 Adaptive Forest Management under Climate Change
	BP MF15 Natural Forest Succession in Case of Stable Forest Ecosystems
	BP MF26 Investments in forest area development and improvement of the viability of forests





BP MG1 Establishment or enhancement of grasslan by regeneration process BP PW1 Preservation and revitalization of wetlanc on floodplains BP PW3 Natural management of wetlands BP PW11 Wetland restoration					nt of grassland on of wetlands nds	
Ecosystem ser	vices potential	ly enhanced				
 Improv Water Securit Land use/clust 	vement of water flood damage n ng water quality ter	supply; hitigation;				
 Agricultural used ecosystem; Forest ecosystems; Grassland in plains; Wetland ecosystems. 						
Applied by						
Austria	Germany	Croatia	Hungary	Italy	Poland	Slovenia

Measure 7			
Global Environmental Facility (GEF)			
Financial source			
GEF Trust Fund			
Description/how it works			
The Global Environment Facility (GEF), an internation countries to invest in global environmental projic degradation, international waters and chemicals. Get donor countries and these financial contributions are as the GEF Trustee, administering the GEF Trust Fun GEF resources; disburses funds to GEF Agencies; pri- resources; and monitors application of budgetary and that contain an array of fund-specific financial in government projects and programs, then government governmental institutions, civil society organization most suitable to develop and implement the project multilateral environmental agreements, for this reas- must be focused on the GEF focal areas (i.e. Biodive International Waters and Chemicals, Land Use and Re-	and co-financing mechanism that provides grants to pects addressing climate change, biodiversity, land EF funding to support the projects is contributed by replenished every four years. The World Bank serves and (contributions by donors) and helping in mobilize repares financial reports on investments and use of d project funds. The Trustee creates periodic reports information. The GEF provides funding to support ts can decide on the executing agency (among others as, private sector companies, research institutions) idea. GEF priorities are to achieve the objectives of son, project and programs to be eligible for funding ersity, Climate Change Mitigation, Land Degradation, storation; Sustainable Forest Management).		
Examples of activities funded Relation with Best Management Practices (BMPs			
 Creation of green corridors; Nature-based flood protection measures; Creation of retention basins; Lakes, ponds, watershed management; Re-naturalization of rivers and wetlands. 	BP MF2 Establishment of a Continuous Cover Forest System; BP MF3 Defined Crown Cover Percentage of Forest Stands; BP MF6 Foster Stability, Vitality and Resilience of the Forest Ecosystems BP MF14 Adaptive Forest Management under Climate Change BP MF15 Natural Forest Succession in Case of Stable Forest Ecosystems BP MF26 Investments in forest area development and improvement of the viability of forests		





	by regeneration process BP PW1 Preservation and revitalization of wetland on floodplains BP PW3 Natural management of wetlands BP PW11 Wetland restoration						on of wetlands Inds
Ecosystem ser	vices potential	ly enhanced					
ImprovWaterSecurit	vement of water flood damage m ng water quality	supply; nitigation;					
Land use/clus	ter						
 Agricu Forest Grassla Wetlar 	Itural used ecos ecosystems; and in plains; nd ecosystems.	ystem;					
Applied by	Cormany	Creatia	Hup	a any	Italy	Poland	Slovenia
Austria	Germany	Croatia	Πung	gary	ιταιγ	Polanu	Slovenia
Measure 8							
National finance	e programmes						
Financial sour	ce						
Private investo	ors						
Description/h	ow it works						
Activities financed by private investors (usually banks), that will support environmental protection projects. Different types of tools could be established by means of loans and credits . At the national level different examples of programme financed by national financial institution are reported including, for instance, the HBOR (Croatian Bank for Reconstruction and Development) (Croatia) and Fondazione CARIPLO (Italy).							
Examples of a	ctivities funded	ł		Relatio	on with Best Ma	nagement Prac	tices (BMPs)
 Creation of green corridors; Nature-based flood protection measures; Creation of retention basins; Lakes, ponds, watershed management; Re-naturalization of rivers and wetlands. BP MF3 Defined Crown Cover Percentage of Forest Stands; BP MF6 Foster Stability, Vitality and Resilience of the Forest Ecosystems; BP MF14 Adaptive Forest Management under Climate Change; BP MF15 Natural Forest Succession in Case of Stable Forest Ecosystems; BP MF26 Investments in forest area development and improvement of the viability of forests; BP MG1 Establishment or enhancement of grassland by regeneration process; BP PW1 Preservation and revitalization of wetlands; BP PW3 Natural management of wetlands; BP PW1 Wetland restoration. 					s Cover Forest tage of Forest Resilience of ement under Case of Stable development orests; nt of grassland on of wetlands ands;		
 Improv 	ement of water	supply;					
 Water 	flood damage m	nitigation;					





Securing water quality.

Land use/cluster

- Agricultural used ecosystem;
- Forest ecosystems;
- Grassland in plains;
- Wetland ecosystems.

Applied by						
Austria	Germany	Croatia	Hungary	Italy	Poland	Slovenia





2. National experiences

Section 2 reports pratical examples of implementation of PES schemes from CE countries identified as the most relevant by Project Partners.

AUSTRIA: Payment Scheme for Drinking Water Protection - City of Waidhofen/Ybbs

The PES scheme for drinking water protection implemented in the Drinking Water Protection Zone (DWPZ) of the city of Waidhofen/Ybbs fund the application of management practices enhancing the provision of water quality and water quantity regulating services of stable forested areas thus securing drinking water quality and quantity for all people supplied with the high-quality spring water. Private and public forest owners can sign a contract with the municipality of Waidhofen/Ybbs committing themselves to implement, in their forested areas, best practices supporting forested ecosystem regulating services provision (i.e. avoid clear cuts). In return they receive a funding on a yearly base. The amount of the payment depends on the hectares of forests within the DWPZ and also on the type of Best Practices applied within this defined area of the DWPZ. The source for financing this measure is the water prize which is charged through the water works of Waidhofen/Ybbs. The scheme started in 2018 with first contracts with forest owners signed in autumn.

GERMANY: Private cooperation between farmers and public water utilities

It is a voluntary, private-law cooperation between the public water utilities and farmers farming in the drinking water catchment area aiming at reducing nitrate inputs and thus water pollution from agriculture. Farmers are directly paid by water utilities to implement measures including reduction of N-fertilization, pesticide restriction/waiver, conversion of arable land into grassland, permanent grassland conservation. Additional costs incurred through the transition to adapted groundwater-friendly land management, including an incentive share, are paid by the public water suppliers. Premiums are paid for the implementation of single measures or with an amount depending on the result of the autumn soil test for N-min. This measure has been already implemented and applied in Freising, Hallertau, Altertheim, Gilching, Werntal, Bastheim.

ITALY: National Payment System for Ecosystem and Environmental Services (PAES)

The National Payment System for Ecosystem and Environmental Services (PAES) has been introduced in the Italian legislation with the Law 221/2015, Art.70, which promotes the design and the adoption of a national scheme to finance ecosystem services provision. The scheme involves a series of payments to land or other natural resource owners in return for a guaranteed flow of ecosystem services or certain actions likely to enhance their provision over-and-above what would otherwise be provided in the absence of payment. Ecosystem Services that will be paid through the scheme include carbon fixation of forests and wood arboriculture, water regulation in mountain basins, biodiversity and landscape quality, water purification. Eligible as beneficiaries of the scheme are municipalities, associations of municipalities, protected areas managers, mountain catchments institutions, associations for common goods management. The PSEA especially puts in evidence: paid service, their value, rules deriving from contracts and ways of payment. The operative implementation of the Law 221/2015, Art.70feature is now under the planning phase and will





be included within the overall reform of the regulation on national parks (Law 394/1991).

SLOVENIA: NATURA 2000 Management Programme

The basic purpose of the management programme is to define the fulfilment of obligations to protect special protection areas - Natura 2000 sites in the 2015-2020 period imposed on the Republic of Slovenia by the Birds Directive and the Habitats Directive. The programme includes detailed conservation objectives and measures for their attainment, among them the water management measure. Water management is important to preserve biodiversity and achieve a favourable conservation status of Natura sites. There are 140 species and habitat types which depend on water to achieve a favourable conservation status. These are species which spend part of their annual or life cycle in water or next to it for reproduction, feeding or overwintering, and habitat types which depend on constant presence of water (ground or surface water). Therefore, the method of water management is crucial for their preservation. Different kind of measures for water management and improvement of ESs can be financed through the programme including measures to restore watercourses; measures to preserve or improve river dynamics, including the flood regime and the level of groundwater; measures to restore sources of pollution; measures related to the management of small dams.

CROATIA: Maintain biodiversity to secure ecosystem services provision

Numerous projects related to the restoration of habitats important for biodiversity conservation (e.g. meadows, pastures and ponds for livestock watering) and disaster risk reduction (e.g. floodplain ecosystems) has been financed by the EU LIFE Programme in Croatia. Among those, some examples are represented by:

-DRAVA LIFE - Integrated River Management (12/2015 - 11/2020) - first inter-sectorial cooperation and integrated management initiative focusing on Croatian rivers. It aims to solve river ecosystem problems, increase pristine, dynamic river habitats, preserve and create new floodplain waters and improve water level dynamics as well as increase awareness of Natura 2000 sites in Croatia.

-IBM - Central Posavina - Wading toward Integrated Basin Management (2006-2008) - project successfully improved the long-term conservation prospects for the Lonjsko Polje Nature Park (the largest floodwater retention area) and associated flood plains by achieving agreement of an official Management Plan for the park and the establishment of a Programme for Integrated River-Basin Management in Central Posavina. Beneficiaries of such activities are local, regional and national authorities including ministries, city government offices, water suppliers, higher education and research (faculties and research institutes), interest groups including NGOs and environment protection groups as well as the general public.





POLAND: Increasing retention and preventing floods and droughts in forest ecosystems in lowlands

From the mid-90s, the Polish forest management authority undertook a variety of small-scale water retention works, financed from a combination of its own and external funds (i.e. the Polish Ecofund, and the Polish National Fund for Environmental Protection and Water Management). In 2006, the authority consolidated all its initiatives into a single programme "Increasing retention and preventing floods and droughts in forest ecosystems in lowland". It is the first to be conducted on such a large scale, combining water retention in forest ecosystems with the protection against surface water run-off. The programme is co-funded by EU Cohesion Fund (85%) and contribution of the beneficiary (15%). It finances environmental methods of water retention in forests through the construction of retention basin and wetlands restoration.

HUNGARY: National Agro-environmental Program

The National Agro-environmental Program (NAKP), launched in 2002, promotes sustainable land use in accordance with the characteristics of different regions. The program provided significant support to multifunctional agricultural land use, based on ecological conditions and the objectives of the agricultural-rural development policy targeted in the EU. The National Agro-environmental Program has more sub-programs; one amongst them is the regional System of Sensitive Natural Areas program. In the framework of the regional programs, support and payments are available for farmers whose farms are in a sensitive area, in compliance with the regulatory packages that meet the ecological conditions and the protection needs of the region. These programs are introduced on those areas where specific measures are needed to overcome existing environmental problems and preserve natural values.

3. Site specific measures in pilots

In Section 3, each of the Best Management Practices (BMPs) identified or already implemented in the national Pilots, are analyzed and linked with potential or already applied funding mechanisms described in Section 1.

SLOVENIA:

Measure 1	
Name	Sustainable drainage system development
Location	Well field Dravlje valley, Ljubljana, Slovenia
Type of ecosystem services funded	Improvement of water supply, securing water quality, water flood damage mitigation
Type of land use	Agricultural land, grassland, forest, water
Description of the measure/funds	Collecting torrential water in wider channels, small retention pond (transient marsh Mali Rožnik) for the purpose of increase available water for animal use and for watering the plants; SUDS (sustainable drainage systems; e.g. small





	retention ponds).
Principal domain	National (i.e. Ministry of the Environment and Spatial Planning (Water Act))
Governance framework	Slovenian Water Agency, local community, utilities responsible management of infrastructure and urban areas, land owners/managers, farmers)
Type of funding mechanisms	Public or government financed
Financial source	National or municipal funds

Measure 2	
Name	Hydrological /hydraulic modelling
Location	Well field Dravlje valley, Ljubljana, Slovenia
Type of ecosystem services funded	Improvement of water supply
Type of land use	Agricultural land, grassland, forest, water
Description of the measure/funds	Water balance status and effective mitigation measures on site specific location are not known (identified) so far
Principal domain	National [i.e. Ministry of the Environment and Spatial Planning (Water Act, Slovenian legislation according to EU Floods directive)]
Governance framework	Slovenian Water Agency (Slovenian legislation according to EU Floods directive floods), Municipality City of Ljubljana, Water utility JP VODOVOD-KANALIZACIJA, d.o.o. (sewage system modelling)
Type of funding	Public or government financed
mechanisms	According to the Decree on conditions and limitations for constructions and activities on flood risk areas (Off. G. 89/08) the financing of modelling of flood risk zones is mainly provided by local communities, where flood hazard maps are a part of municipal spatial plans development. For the national defined flood priority zones financing is sometimes provided by the state budget (through Water Agency).
Financial source	National and municipal funds

Measure 3	
Name	Identification on drinking water protection zones (DWPZ) and inspection over existing DPWZ restrictions
Location	Well field Dravlje valley, Ljubljana, Slovenia
Type of ecosystem services funded	Improvement of water supply, securing water quality, water flood damage mitigation





Type of land use	Agricultural land, grassland, forest, water
Description of the measure/funds	DWPZ areas for potential water source are not determined and inspection over DWPZ restrictions is not implemented. With modelling DWPZ areas will be determined. Compliance of DWPZ restrictions has to be strictly supervised/inspected
Principal domain	National (i.e. Ministry of the Environment and Spatial Planning (Water Act, Decree on DWPZ))
Governance framework	Slovenian Water Agency (water consents for intervention in to DWPZ), Municipality City of Ljubljana (planning, Municipal spatial plan), land owners
Type of funding	Public or government financed
mechanisms	Private schemes or User-driven
	Drinking water protection zones are defined by the Water Act (67/02) in the process managed and financed by the Ministry of the Environment and Spatial Planning. Since 2004, the transition from municipal level defined DWPZ to state defined DWPZ is ongoing. The shift was important as the groundwater resources are usually in several municipalities, therefore harmonized identification and declaration of GWPZ should be orchestrated.
	Some costs related to the implementation of the DWPZ status (e.g. compensation payments for farmers due to the farming limitations) are covered by the water supply - part of the pricing mechanism to the end-users.
Financial source	National funds, End water users (households and activities) - compensation payments.

Measure 4	
Name	Redefinition of time ban of fertilizers and manure application
Location	Well field Dravlje valley, Ljubljana, Slovenia
Type of ecosystem services funded	Improvement of water supply, securing water quality , water flood damage mitigation
Type of land use	Agricultural land, grassland, forest,
Description of the measure/funds	Inflexible time ban of fertilizers and manure application of farmers. Redefinition of time ban of fertilizers and manure application according to climatic and hydrologic conditions. Fortifying inspection and education of farmers.
Principal domain	National (i.e. Ministry of Agriculture, Forestry and Food (realisation of the nitrate directive), Ministry of the Environment and Spatial Planning (nitrate directive implementation))
Governance framework	Chamber of Agriculture and Forestry of Slovenia, Ministry of the Environment and Spatial Planning (inspectorate), farmers
Type of funding	Public or government financed





mechanisms	Legislation change - changing the decrees and implementation framework (supervision, control, inspection) and empowerment/implementation. Funding mechanisms for the legislative controlling measures is ensured at the state level.
Financial source	National funds

Measure 5	
Name	Implementation of measures for the improved road rainwater discharge
Location	Well field Dravlje valley, Ljubljana, Slovenia
Type of ecosystem services funded	Improvement of water supply, securing water quality, water flood damage mitigation
Type of land use	Agricultural land, grassland, forest
Description of the measure/funds	Improved collection and treatment of road rainwater discharge, particularly within drinking water protection areas - retention volumes, settlement tanks, coalescent filters, monitoring
Principal domain	National (i.e. Ministry of the Environment and Spatial Planning (Decree on the emission of substances in the discharge of meteoric water from public roads))
Governance framework	Municipality City of Ljubljana, Utility for municipal public road maintenance (KPL d.o.o.), Highway management (DARS d.d.)
Type of funding mechanisms	Private schemes or User-driven
	Polluter pay principle - organizations managing and maintaining traffic infrastructure (usually public companies, concessionaires) have to implement and maintain the measures.
Financial source	Private funds (taxes)
	From the road toll, or general taxes if they are financing the operation and maintenance of road infrastructure.

ITALY:

Measure 1	
Name	The Drought Steering Committee and DEWS modelling tool
Location	Po River Basin District
Type of ecosystem services funded	Improvement of water supply
Type of land use	Mixed land: agriculture, grassland, forest, urban
Description of the measure/funds	Maintenance and improvement of quantitative and qualitative observation, modelling and prediction of the Po River Basin District; operational support to the Permanent Observatory on Water Uses and to the Drought Steering





	Committee
Principal domain	Po River Basin District Management Plan
Governance framework	The measure is already implemented and financed through the Drought Framework Institutional Agreement, including the main stakeholders. Multilevel governance is based on integration of spatial/temporal scales according to the subsidiarity principle, cooperation, active participation, integration of sectoral/territorial cyclic processes and tools related to water management
Type of funding	Public or government financed
mechanisms	Private schemes or User-driven
	Water users pay for the service to the Regions and the region finances the DEWS modelling tool. Other mechanisms derive from national and regional public funds as also from European funding
Financial source	Normally abstraction fees of surface and ground water are used.
	Funds are also available from national and regional budgets (e.g. National Operational Programme 2017-2023 "Mettiamoci in riga": Platform for exchanging knowledge)
	Economic resource are also findable in EU funding programmes (LIFE, INTERREG, H2020)

Measure 2	
Name	The Flood Forecast Center and FEWS modelling tool
Location	Po River Basin District
Type of ecosystem services funded	Water flood damage mitigation
Type of land use	Mixed land: agriculture, grassland, forest, urban
Description of the measure/funds	Maintenance and improvement of quantitative observation, modelling and prediction of the Po River Basin District; operational support to the Po River Flood Forecast Center
Principal domain	Po River Basin District Flood Risk Management Plan - Interregional Agency for the Po River Operational Programme
Governance framework	The measure is already implemented and financed through the Flood Framework Institutional Agreement. Multilevel governance is based on integration of spatial/temporal scales, according to the subsidiarity principle, active participation, integration of spatial, environmental and emergency planning related to flood risk management
Type of funding mechanisms	Private schemes or User-driven Public or government financed





	Citizens pay taxes to the Regions and Regions finance the modelling tool. Other mechanisms derive from national, regional and municipal public funds as also from European funding (European Civil protection programme)
Financial source	Private funds (taxes)
	National, regional and local funds (e.g. National Operational Programme 2017-2023 "Mettiamoci in riga": Platform for exchanging knowledge)
	EU funding programmes (LIFE, INTERREG, H2020, ECHO)

Measure 3	
Name	Analysis of the impacts of climate changes on drinking water resources
Location	Taro river basin (one of the main sub-basin in Po River Basin, Italy)
Type of ecosystem services/public services funded	Improvement of water supply, securing water quality
Type of land use	Mixed land: wetlands/agriculture/urban
Description of the measure	Implementation of an integrated modelling approach to quantify the effects of land use change and climate change on water quantity and quality, and, ultimately, to evaluate the cascading impacts on freshwater ecosystem services (FWES) and human well-being. The measures represent an effective tool for exploring the likely outcomes of alternative management options and climate and land use change scenarios and for evaluating trade-offs among water users and freshwater services
Principal domain	Local level, monitoring of the progresses toward the achievement of the targets of WFD, implementation of Nitrate Directives
Governance framework	Regional authorities, regional environmental agencies (e.g. Arpae), Po River Basin District Authority.
Type of funding	Public or government financed
mechanisms	Private schemes or user driven
Financial source	EU funding programmes (LIFE, INTERREG, H2020),
	Rural Development Plans (measures bridging the gap between research and agriculture)
	National Operative Program 2017-2023 "Mettiamoci in riga", "Piattaforma della conoscenze" (Platform for exchanging knowledge).
	Water users (e.g. Consorzio di irrigazione parmense and Società Canale Naviglio Taro for agriculture; Emiliambiente and IRETI for drinking water) could pay for the implementation and maintenance of the model, within the framework of regional and district planning tools for Climate Change adaptation.





AUSTRIA:

Measure 1	
Name	Drinking Water Protection Zone (DWPZ) Waidhofen/Ybbs
Location	City of Waidhofen/Ybbs,
Type of ecosystem services funded	Improvement of water supply, securing water quality
Type of land use	Forests
Description of the measure/funds	More than 83 % of the DWPZ are forested and the purpose of the measure is securing drinking water quality and quantity for all people supplied with the high-quality spring water. The forest owners within the DWPZ (PA 1.2) will be informed about the possibility to apply for funding, if they are willed to implement the Best Practices defined in the respective directive of the municipality. This directive was resolved by the city council end of May 2018 as a result of stakeholder involvement in the project PROLINE-CE.
	All forest owners can sign a contract with the municipality and will receive the funding on a yearly base. The amount of funding will depend on the number of hectares of forests within the DWPZ and also on the type of Best Practices applied within this defined area of the DWPZ. The implementation of the first contracts with forest owners will start in autumn 2018.
Principal domain	Municipal (i.e. Municipality of the city of Waidhofen/Ybbs - Water Works)
Governance Framework	Municipal (i.e. Municipality of the city of Waidhofen/Ybbs - Water Works)
Type of funding mechanisms	Public or government financed
Financial source	Water prize which is charged through the water works of Waidhofen/Ybbs.

Measure 2	
Name	Drinking Water Protection Zone (DWPZ) city of Vienna
Location	City of Vienna
Type of ecosystem services funded	Improvement of water supply, securing water quality
Type of land use	Forests, agriculture mountain grassland
Description of the measure/funds	In the case of forestry, the implemented measure is 'land acquisition' by the city of Vienna. Through this act the desired Best Management Practices for forestry can be applied through the own staff (Forest Department of the city). The BMP's were defined together through the water works of the city (Vienna





	Water, PP2 in PROLINE-CE) and the Forest Department of the city. The beneficiaries in the case are the former land owners who can sell their land while the city of Vienna provides the funding for this process. In the case of agriculture (alpine pastures) the land owners receive consultation and also support for the construction of structures supporting drinking source water protection. Vienna Water on the other hand had set up contracts with the farmers who oblige those to grassland management practices in accordance with defined PROLINE-CE BMP's for securing drinking water quality.
Principal domain	Municipal (i.e. Municipality of the city of Vienna - Vienna Water)
Governance Framework	Municipal (i.e. Municipality of the city of Vienna- Vienna Water)
Type of funding mechanisms	Public or government financed
	Private schemes or user driven
	The type of funding mechanism is 'land acquisition' oror private deals and contracts with the farmers, who use the land according to old servitudes and with the alpine associations who own the huts
Financial source	Water prize which is charged through the city of Vienna. Hence it is a municipal funding

GERMANY:

Measure 1	
Name	Finding site-specific solutions with public engagement and hydrologic models
Location	Bavaria
Type of ecosystem services funded	Improvement of water supply, securing water quality, water flood damage mitigation
Type of land use	Grassland, fields, ponds, viticulture, horticulture
Description of the measure/funds	Public engagement should take place already at early steps of the decision process. The development of action plans for the implementation of protection plans should be carried out in close cooperation with land owners that are directly affected by future regulations in the delineated protection zones. Possible actions and measures should be elaborated based on land owner's possibilities to use existing structures/facilities/machinery.
	We propose hydrological models as BMP here; the model can be used to test how any kind of changes (such as land use changes) affect the hydrological processes in the considered area. Moreover, a fully coupling between monitoring and model can provide a powerful tool for on-the-fly decision making. Modelling results can provide relevant information for stakeholders regarding water quantity and quality and support decision makers in the





	implementation procedure for final management plans. In close cooperation between land owners and decision-makers, site-specific solutions can be found which can reduce the trade-offs between all stakeholders.
Principal domain	Regional
Governance Framework	National and regional
Type of funding mechanisms	Public or government financed
Financing sources	National and regional funds
	European Agricultural Fund for Rural Development (EAFRD)

Measure 2	
Name	Continuous monitoring in both, surface water and groundwater
Location	Bavaria
Type of ecosystem services funded	Improvement of water supply, securing water quality, water flood damage mitigation
Type of land use	Agriculture, forests
Description of the measure/funds	Enlarge the infrastructure of the existing monitoring network towards a higher temporal and spatial resolution of relevant water quality and quantity data. Therefore, in a first instance, an overview over existing data needs to be gathered to identify relevant, i.e. site-specific and question-related, data gaps. Once relevant gaps were identified, suitable installation points for new measuring devices have to be found and the temporal resolution at which each measuring device should operate have to be set. Finally, the enhanced monitoring program can start.
	Generally, the value of a continuous monitoring of water-related data should be more emphasized in existing policy guidelines. Water suppliers as well as water authorities should receive incentives to better manage available data and to collect hydrological data more frequently and with a higher spatial resolution.
Principal domain	Regional
Governance Framework	National and regional
Type of funding mechanisms	Public or government financed, privately financed
Financing sources	National and regional funds
	European Agricultural Fund for Rural Development (EAFRD)





HUNGARY:

Measure 1	
Name	Planning, IT and monitoring for water management and climate change impacts
Location	Central Hungary
Type of ecosystem services funded	Improvement of water supply, securing water quality, water flood damage mitigation
Type of land use	Arable land, grassland, forest, urban areas
Description of the measure/funds	The objective of the project is further developing a monitoring system to ensure the quantitative and qualitative monitoring of waters in order to meet the information demand related to the implementation of the Water Framework Directive. This could improve water security and reduce the negative effects of flood events on the water supply. It would also provide an opportunity to monitor the effectiveness of other measures.
Principal domain	National and WFD Directive
Governance framework	National Development Agency, Ministry of Environment and Water, Central Directorate for Water and Environment
Type of funding mechanisms	Public or government financed
Financial source	EU Cohesion Fund

Measure 2	
Name	Flood-level reducing reservoir implementation
Location	Pély, Tiszasüly, Jászkísér (Jász-Nagykun-Szolnok country)
Type of ecosystem services/public services funded	Water flood damage mitigation
Type of land use	Riparian strips
Description of the measure	The Hanyi-Tiszasüly flood-level reservoir project is part of the Vásárhelyi Plan Improvement Program, which fits into the development plans of the flood protection system of the Tisza Valley. The aim of the work to develop flood protection in the Tisza Valley to protect people and properties against floods by integrating the ecological development of the Tisza, tributaries and floodplains.
Principal domain	National and EU Flood Directive, WFD Directive
Governance framework	National Development Agency, Ministry of Environment and Water, Central Directorate for Water and Environment
Type of funding	Public or government financed





mechanisms	
Financial source	EU Cohesion Fund, national funds

POLAND:

Measure 1	
Name	Establishment of constant, multi-aspects water monitoring in the catchment scale
Location	Kozłowa Góra reservoir and its catchment area (Poland)
Type of ecosystem services/public services funded	Improvement of water supply, securing water quality, water flood damage mitigation
Type of land use	Agricultural land, grassland, forest, water
Description of the measure	Constant multi-aspect water monitoring provides full information of surface and groundwater quantity and quality which is used in modelling simulations.
Principal domain	National
Governance framework	National (i.e. Polish Waters, Polish Hydrogeological Survey, Institute of Meteorology and Water Management)
Type of funding mechanisms	Public or government financed Private schemes or user driven
Financial source	Private fund; National Fund of Environmental Protection and Water Management

Measure 2	
Name	Proposal of DPWPZ establishment
Location	Kozłowa Góra reservoir and its catchment area (Poland)
Type of ecosystem services/public services funded	Improvement of water supply, securing water quality, water flood damage mitigation
Type of land use	Agricultural land, grassland, forest, water
Description of the measure	Proposal of establishment of DWPZ in the area of Kozłowa Góra reservoir. The proposal assumed the limitation in land use and land management in the area of established zone. Establishing limitation in land use will lead to decrease in pollution loads to water environment and, thus, improve reservoir water quality
Principal domain	National in relation to EU legislation supplemented with Security of drinking





	water supply - Guidelines for risk and crisis management EN 15975 - part 1 & 2 $$
Governance framework	National (i.e. Polish Waters) regional (i.e. Province Governor)
Type of funding mechanisms	Private schemes or user driven
Financial source	Private funds

Measure 3	
Name	Complex catchment modelling
Location	Kozłowa Góra reservoir and its catchment area (Poland)
Type of ecosystem services/public services funded	Improvement of water supply, securing water quality, water flood damage mitigation
Type of land use	Agricultural land, grassland, forests
Description of the measure	Catchment modelling, using the Soil Water Assessment Tool (SWAT), will provide complex information about possible water quality and quantity threats and make prediction of water quality through scenario's simulations included climate change, wastewater discharges, using more fertilizers and so on. The analysis will provide complex information about water resources, quick reaction on possible impact as part a risk assessment of water supplying system.
Principal domain	National in relation to EU legislation supplemented with Security of drinking water supply - Guidelines for risk and crisis management EN 15975 - part 1 $\&$ 2
Governance framework	National (i.e. Polish Waters) regional (i.e. Province Governor)
Type of funding mechanisms	Public or government financed; Private schemes or user driven
Financial source	Private fund; National Fund of Environmental Protection and Water Management

Measure 4	
Name	Establishment of an ecology model of water reservoir
Location	Kozłowa Góra reservoir and its catchment area (Poland)
Type of ecosystem services/public services funded	Improvement of water supply, securing water quality, water flood damage mitigation





Type of land use	Agricultural land, grassland, forests
Description of the measure	Establishment of the ecology modelling of water reservoir gives a complex information on reservoir's ecosystem (including flora and fauna) and factors possibly having an influence on water quality and water quantity. The model simulation provides complex information on water ecosystem and can be used as one element of risk assessment.
Principal domain	National in relation to EU legislation supplemented with Security of drinking water supply - Guidelines for risk and crisis management EN 15975 - part 1 & 2.
Governance framework	National (i.e. Polish Waters) regional (i.e. Province Governor)
Type of funding mechanisms	Public or government financed; Private schemes or user driven
Financial source	Private funds National Fund of Environmental Protection and Water Management

Measure 5	
Name	Raising awareness and increasing knowledge
Location	Kozłowa Góra reservoir and its catchment area (Poland)
Type of ecosystem services/public services funded	Improvement of water supply, securing water quality, water flood damage mitigation
Type of land use	Agricultural land, grassland, forests
Description of the measure	Set of society and stakeholders' meetings to raise awareness and increase their knowledge. It gives the opportunity for direct contact with society to raise awareness and increase their knowledge.
Principal domain	National, regional and municipal
Governance framework	National (i.e. Polish Waters) regional (i.e. Province Governor)
Type of funding mechanisms	Public or government financed
	Private schemes or user driven
Financial source	Private funds, LIFE+ funds,
	National Fund of Environmental Protection and Water Management





CROATIA:

Measure 1	
Name	Establishment of groundwater level monitoring network
Location	Several locations in Imotsko polje and some parts of South Dalmatia
Type of ecosystem services funded	Improvement of water supply
Type of land use	Agricultural land
Description of the measure/funds	This measure aims to increase knowledge about complex interactions between groundwater levels and floods, increased demand (population, tourism and agriculture), drought and possible hazards (due to recent earthquake, whole river disappeared for several hours in Imotsko polje)
Principal domain	National (i.e. Ministry of Environment and Energy)
Governance framework	National, municipal Croatian waters are implementing body for water policy and infrastructure. Location of monitoring sites is determined by expert community (e.g. university or institute) in cooperation with local utilities and community.
Type of funding mechanisms	Public or government financed Private schemes or user driven
Financial source	National funds (i.e. Ministry, Croatian waters); H2020, LIFE

Measure 2	
Name	Infrastructure maintenance and reconstruction / Non-structural flood mitigation measures
Location	Imotsko polje and part of South Dalmatia
Type of ecosystem services funded	Improvement of water supply, water flood damage mitigation
Type of land use	Agricultural land, urban
Description of the measure/funds	This measure is a mixture of structural and non-structural (green) interventions such as drainage tunnels, river regulation, planting of flood proof crops and establishment of protective forests.
Principal domain	National (i.e. Ministry of Environment and Energy, Ministry of Agriculture)
Governance framework	National, municipal Croatian waters are implementing body for water policy and infrastructure. Local community and infrastructure providers are also responsible for





	infrastructure maintenance and cleaning. Cross-border cooperation should be enhanced to optimize cross-border catchment and river management.
Type of funding	Public or government financed;
mechanisms	Private schemes or user driven
Financial source	National funds (Ministries, Croatian waters, local service providers and communities;
	H2020, LIFE
	European Investment Bank (EIB) loans

Measure 3	
Name	Defining and establishing sanitary protection zones in South Dalmatia and Imotsko polje
Location	Imotsko polje and part of South Dalmatia
Type of ecosystem services funded	Improvement of water supply, securing water quality, water flood damage mitigation
Type of land use	Various
Description of the measure/funds	For many springs used by public water supply system, DWPZ are not proclaimed. For existing DWPZ, inspections over restrictions are lacking or not implemented at all. Compliance with rules and regulations must be strictly supervised
Principal domain	National (i.e. Ministry of Environment and Energy (Water Act)); regional (i.e. County (Decree on DWPZ))
Governance framework	National
Type of funding mechanisms	Public or government financed;
Financial source	National funds

Measure 4	
Name	Natural wastewater treatment system
Location	Imotsko polje and part of South Dalmatia
Type of ecosystem services funded	Securing water quality
Type of land use	Urban
Description of the measure/funds	Natural wastewater treatment system represents artificial swamps that simulate natural purification processes. They cost significantly less than





	common treatment plants and require almost no energy. They are ideal for smaller settlements or industrial units.
Principal domain	National (i.e. Ministry of Environment and Energy, Ministry of Construction and Spatial Planning)
Governance framework	National
Type of funding mechanisms	Public or government financed
	Private schemes or user driven
Financial source	National funds, private investments

Measure 5	
Name	Climate change adaptation and resilience / Reconstruction of public water supply network
Location	Imotsko polje and part of South Dalmatia
Type of ecosystem services funded	Improvement of water supply, securing water quality, water flood damage mitigation
Type of land use	Various
Description of the measure/funds	This measure involves a set of administrative and structural measures to combat negative effects of climate changes. It involves rationalization of consumption, water re-use, promoting alternative sources, spatial planning measures for flood mitigation, monitoring, modelling, reduction of losses from water supply networks, construction of accumulation structures, controlling surface runoff in urban environment, green retention and infiltration zones etc.
Principal domain	National (i.e. Ministry of Environment and Energy)
Governance framework	National
Type of funding mechanisms	Public or government financed;
	Private schemes or user driven
Financial source	Domestic or foreign
	Several possible funding schemes:
	Various EU funds (LIFE, Twinning, Horizon,)
	Domestic (several loan options from banks and programmes or/and Fund for energy efficiency and nature protection)





Conclusions

The analysis reveal that most common applied PES scheme across CE are those public or government based, in which are government agency other public institutions providing direct payments and subsidies to landowners to steward and manage their land in ways that will generate or enhance ecosystem services. The primary sources of public incentives for ESs management are represented by EU funds, in some cases, complemented by national and regional financing mechanisms also incorporating private sector funding. Despite at European level there is no specific EU policy framework addressing ecosystem services the ES concept is already to some extent implicitly embedded in existing policies on nature and natural resources (Maes et al., 2013) including for instance Green Infrastructure Strategy, Forest Strategy, CAP/RDR, which thus represent policy drivers of payments for ecosystem services in Europe. For most policies, there are various EU funds available to finance measures which are indeed also used to finance specific ESs. Specifically, the EU Agricultural Fund for the Rural Development (EAFRD) featured prominently across many of the analysed national experience: Agri-environmental-climate payments, Natura2000 and WFD payments and investments in forest areas represented the most commonly used type of PES schemes. Other EU funds commonly used are the EU Cohesion Fund, the Life/Life+ Programme, the EU Regional Development Fund (ERDF) and H2020 and Interreg funds for research and innovation. However this reliance on a restricted set of EU-funded and designed financing tools, each with their own internal logic and rules, in practice jeopardize the degree to which a policy can address all ecosystem services. For example, financing multiple - or bundles of - services at the same time, to reduce trade-offs between ecosystem services and to account for the joint production of ecosystem services, is usually impossible with EU financing schemes such as EAFRD (Plieninger et al., 2012). Some national experience reported best practices in this sense proposing national PES schemes which however are still limited to a small set of ESs (i.e. agricultural services; Hungary) or are still under implementation in the national legislation (i.e. Italy).

Despite their small profile, private schemes or user-driven PES are growing steadily in number especially in watershed management with experience and best practices reported in Italy, Austria and Germany. Most user-driven schemes take the form of direct contract between a single buyer of ES and one or more landowners and are typically fully financed by water users. Water users are mainly represented by water utilities (public or private) and private sectors entities (i.e. companies and coorporations).

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