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Summary

This deliverable provides an overview of successful examples of funding and financing strategies to implement ecosystem conservation and nature-based solutions (NBS) projects to address water related risks, including floods, droughts, water quality degradation, wildfires and associated impacts on water pollution, among others.

An ambitious selection of international examples and national experiences collected from the literature by the NAIAD partners are categorized and reported through two different lenses. First, a set of examples is described highlighting the value generated and how such value has been perceived by implementers/investors and used to mobilize funds for implementation. Second, a set of funding instruments and facilities are described focusing on how the funding and financing arrangements have been designed and set up to enable implementation of the measures. Finally, a reflection on the analysed examples is made to draw lessons learnt from existing experiences and highlight the aspects where information is scarcer and could be reinforced when documenting and reporting cases in order to support awareness and evidence needed to encourage investments in NBS.

Some key findings from the analysis of international examples of successful value capture for NBS implementation include the following aspects:

- Environmental regulation is one of the key drivers promoting the implementation of this type of initiatives, but transaction costs of NAS creation should be addressed.
- Public institutions who are responsible for water resources and disaster risk management have a prominent role as NBS implementors, as well as water utilities within the private sector.
- There are successful initiatives driven by the pool of potential payers affected by the problem and thus benefited by the solution. These include local businesses, farmers and urban citizens as direct beneficiaries, and insurance companies and tourists as indirect beneficiaries. Participation of multiple actors has been identified as a key for success in several cases.
- Overall, there is a poor reporting of certain aspects that are important to consider by potential investors, particularly lifecycle and opportunity costs, quantified impacts and benefits or performance results, and avoided costs.

The most relevant findings from the analysis of funding instruments and facilities include the following:

- The design of implementation arrangements requires to address concerns on land ownership.

- However, the existence of motivated buyers perceiving ecosystem service scarcity drives the emergence of green markets and deals. Particularly, the most successful organizational arrangement is the Investment in Watershed program with a single downstream beneficiary. However, the existence of legislation and enforcing mechanisms is critical to grant the success of markets and credit trading.
- The definition of metrics is a critical point to structure a transaction exchanging fungible services for money. There is a trade-off between setting metrics that reduce transaction and adopting those which capture the complexity of the service to be provided.
- There is a financing gap for green finance in general, and for NBS in particular, as well as a lack of capacity to link up finance with projects meeting fund requirements.
- Financers and institutional investors perceived NBS as highly risky investments.
- The most sophisticated financing mechanisms imply significant transaction costs, mainly suitable for large-scale landscape interventions. The main mechanisms to reduce them are the technical readiness and the use of already exiting banking mechanisms. In this sense, the energy sector could be used as a reference.
- Despite the generalized idea that investors usually prefer short-term investments, there is a sustainability-oriented market.

1 Introduction

Ecosystem restoration and nature-based solutions (NBS) implementation initiatives and experiences are increasing around the world. Having information reported on what worked and what didn't, the 'do's and 'don't's, the barriers found and the lessons learnt for replication or improvement is critical to provide a base for replication of successful initiatives. In the particular case of the European countries, diffusion and learning on NBS implementation formulas has been limited. Particularly, knowledge on their potential and impacts to support in addressing water related risks and hazards management (TNC and Miteco, 2019), as well as on successful formulas to overcome one of the financing barrier to build the bridge between the design phase and the actual implementation phase are needed.

At the international level, a number of recent conferences discussing climate change adaptation (CCA) and incorporating NBS as one of the critical streams have put a strong focus on the financing needs for NBS implementation, the reporting and upscaling of successful examples, and needs to build the business case for international and private investors to consider NBS as interesting investments. Some of these conferences where NAIAD has been present and provided contributions include the Climate Innovation Summit 2018, Stockholm World Water Week 2018; PARIS Think Nature Forum on Nature Based Solutions, 2019; European Climate Change Adaptation Conference 2019, among others. Meanwhile, several international organisations such as IUCN (Cohen et al., 2016), The Nature Conservancy (Abell et al. 2017), UNESCO (WWAP, 2018) or the European EKLIPSE project (Raimond et al., 2017) have started active initiatives to identify and document practical examples being implemented around the world in order to give visibility to these pioneering cases. These examples and related literature cover a wide range of fields and challenges for which nature-based solutions can provide answers and solutions.

Within the scope of NAIAD and WP7 on funding and financing instruments, our focus has been put on those more specific or closely related to NBS solutions applied to risk and impact reduction in the context of water related risk (what has been called the Natural Assurance Schemes or NAS), and the analysis of what have been the keys for success in capturing value and raising funding and financing strategies for implementation. This deliverable provides an overview of successful examples of funding and financing strategies to implement ecosystem conservation and nature-based solutions projects to address water related risks, including floods, droughts, water quality degradation, wildfires and associated impacts on water pollution, among others.

An ambitious selection of international examples and national experiences collected from the literature by the NAIAD partners are categorized and reported through two different lenses. First, a set of examples is described highlighting the value generated and how such value has

been perceived by implementers/investors and used to mobilize funds for implementation. Second, a set of funding instruments and facilities are described focusing on how the funding and financing arrangements have been designed and set up to enable implementation of the measures. Finally, a reflection on the analysed examples is made to draw lessons learnt from existing experiences and highlight the aspects where information is scarcer and could be reinforced when documenting and reporting cases in order to support awareness and evidence needed to encourage investments in NBS.

2 Successful international examples of value capture and funding for implementation of NBS initiatives

2.1 Reporting framework and example categories

This section applies the Natural Assurance Scheme canvas (NAS canvas) framework developed and presented in D7.2 for the reporting and description of successful examples of funding initiatives for implementation of water risk reducing NBS. The framework is aimed to sequentially identify and describe three aspects: i) the process and elements involved in the provision of the natural risk reduction services by an NBS or set of measures (NBS + soft measures), from both the supply and the demand side; ii) the actors involved and their potential roles; and iii) how the value of these services can be translated into revenues or funding resources required for the execution of the measures. The NAS canvas can be used for the identification of potential business models and the required elements for NBS implementation, as reflected in D7.2, but also serves as a fairly comprehensive framework to describe the features of an NBS implementation initiative. It also helps diagnose the type of information required and available to report the results in a way that is useful for engaging and convincing investors and attract interest on this type of initiatives.

The NAS canvas framework is an adaptation of the traditional business model canvas tailored to the specificities of Nature Based Solutions and their contextual framework. The business model canvas is traditionally used to support companies and businesses to identify and structure their value proposition and the elements required to develop a strong and feasible business model. An example is the canvas by Osterwalder and Pigneur (2010); available at https://strategyzer.com/canvas. The NAS canvas builds on the traditional model canvas, and is expanded to incorporate elements of both the so called 'PPP canvas' for ecosystem services developed by the Inclusive Business Hub[1] (see annex 1) and the economic analysis methodology developed in WP4, in order to allow capturing the extended array of co-values, actors and contextual settings inherent to NBS that will ultimately determine and condition the structure and feasibility of a NAS business model. We understand business model as a description of the rationale of how an organization creates, delivers, and captures value, in economic, social, cultural or other contexts (adapted from (Osterwalder, Pigneur, & Clark, 2010). It defines the way by which an organization offers value to customers, entices customers to pay for value, and converts those payments to benefits. In the context of NAIAD, due to the often hybrid nature of services (public and private), we will consider how a different organization - be it public, private e.g. an enterprise, an NGO, or a community of citizens - can deliver value to end users.

[1] http://www.inclusivebusinesshub.org/pppcanvas-a-simple-tool-to-tackle-complex-business-models-of/

Thus, it also considers the social value (see WP4 for discussion on benefits – private and public and co-benefits).

The canvas format is a quick visual way to compile the key information in a one eye-shot format. However, it can fall short of space and blurry when more detailed descriptions with further information need to be reported. Therefore, we have turned the canvas into a table that displays the linear sequence of blocks that cluster the different components describing how value flows from the supply to the demand side, and the different elements required in this process.

The flow diagram in figure 2 shows the linearization and clustering of NAS canvas components and the sequential process proposed to facilitate the understanding, identification and description of those components when applied to particular NAS strategies.

The description and definition of the different clusters and components is described here below.

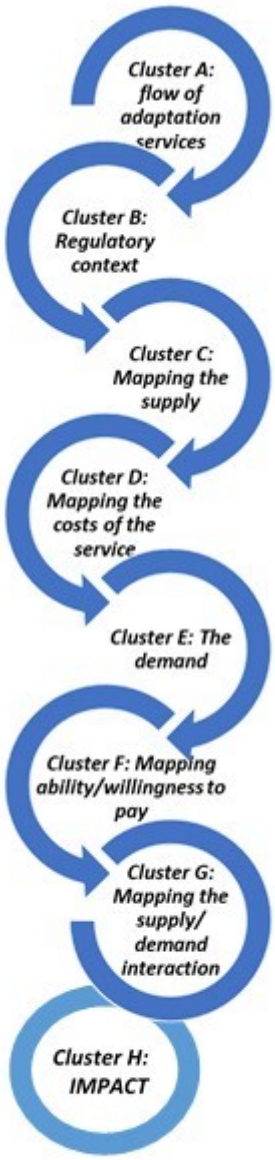

Figure 1. NAS Canvas Flow Process

CLUSTER A: FLOW OF ECOSYSTEMIC SERVICES

This cluster defines the main problem to be addressed and the value proposition provided by the particular NAS to address this challenge.

STEP 1: Problem to be addressed. Main problem to be addressed by the NAS initiative.

STEP 2: Value proposition. In the traditional canvas the Value Proposition is the reason why customers turn to one company over another. It solves a customer problem or satisfies a customer need. The value and main selling point of the NAS strategy will be the capacity to solve the problem (risk reduction function) plus the additional benefits it provides (additional values) which are not provided by other grey alternatives. Therefore, the value proposition is composed of the *primary value* generated by the main function (risk reduction measured through avoided damage costs) and the added value (value generated by the co-benefits). The total value can be estimated as the sum of steps 2A+2B, and it will reflect the comparative advantage with other alternatives.

2A. Primary Value: in the NAIAD framework, the main value is reduction of impacts from extreme water related climate events expressed as economic losses (risk function - avoided costs or damage costs) through risk reduction and prevention.

2B. Secondary or added value: all additional values provided that are not obtained with other alternatives (co-benefits) and entail a competitive advantage. These values are difficult to express quantitatively and in monetary terms, so the use of alternative impact indicators or qualitative indicators can be alternatively used to give some value estimation.

CLUSTER B: REGULATORY CONTEXT

STEP 3: Regulation. Regulation impacting or articulating the target problem management and the specific areas or disciplines involved by the solution, i.e. land use management, water management, soil and agricultural management, etc., or lack of such required regulation.

CLUSTER C: MAPPING THE SUPPLY

STEP 4: Who implements. Identification of the main agent/s responsible for implementing the strategy. For NAS strategies involving multiple measures, these can be specified by measure.

STEP 5: Key activities. List of activities required for the implementation of the measures composing the NAS strategy (NBS/Hybrid/grey/soft). This includes the set of measures applied and a breakdown of specific activities within each measure when information is available.

STEP 6. Key resources. Resources needed to implement the strategy (existing and non-existing at present- non-monetary) e.g. knowledge, people and capacity, legal frame, political support, other, ….

STEP 7. Key partners. Partners required to implement the solutions and provide the service, i.e. technology centers, regional public administrations, developers, operators, funding partners,…

STEP 8: Service provision. Describe the services provided by the strategy distinguishing between:

8A. Primary service: main service provided (main target of the implemented strategy)

8B. Secondary services: array of additional services (co-benefits) resulting from the implementation of the strategy.

CLUSTER D: MAPPING THE COSTS OF THE SERVICE

STEP 9. Cost structure. Different type of costs associated to the implementation of the strategy, following NAIAD's economic framework (Graveline et al., 2017).

9A. Lifecycle costs: includes capital costs and operation and maintenance costs.

9B. Opportunity costs: the benefit, profit, or value that would have been generated by implementing other alternatives.

CLUSTER E: MAPPING THE DEMAND

STEP 10: who owns the problem. Who is directly affected by the problem or suffers the problem that the NAS is addressing (flood damages, water shortage…).

STEP 11: Customer segments. The demand side of the service provision can be segmented into different groups based on needs, behaviors and other traits that they share. A customer segment for NAS may be defined through spending behaviour (customers, clients), interests, and motivations.

11A. Direct beneficiaries of primary value: agents that benefit from the solution through damage costs/avoided damages.

11B. Clients: the ones who are actually paying for the service. They may - or may not - own the problem, being directly responsible for it.

11C. Indirect beneficiaries: the extended beneficiaries of real and potential benefits and co-benefits who are currently not paying for the service but may be potentially interested to pay for the co-benefits generated when fully aware of their value.

CLUSTER F: MAPPING THE ABILITY/WILLINGNESS TO PAY

STEP 12: Revenue streams. This component relates to the cash a company generates from each Customer Segment. In the NAS canvas framework, it identifies the possible income streams generated as a result of the service provision/value generated (including both private streams and public goods) for which each customer segment is willing to pay, and which can provide an economic return.

STEP 13: Funding. Funding is the money required to implement the measures, that can be obtained from a single source upfront, or from the customer segments. Some of the revenue streams identified in the previous step may need to be devoted to cover the lifecycle costs of the measure through the economic instruments explained below. Funding sources can include a mixture of the following instruments:

13A. Tariffs: charges paid by the users of the product or service as a “price” (i.e. water tariff,…)

13B. Taxes: charges paid by the users of the product or service as a fix percentage of the value (i.e. VAT) or local taxes perceive by Municipalities for sectoral policies that may be used to fund NAS.

13C. Transfers: money provided by external actors such as primarily official development assistance, philanthropic donations, grants, governmental/institutional funds, etc.

13D. Private funds or investment: money invested by the private sector or private investors.

The original NAS CANVAS framework developed in D7.2 to describe value capture and business models did not cover the financing aspects. However, an additional item to identify the financing instruments used by successful initiatives when reported has been included in the descriptive tables to report the examples (annex 1) in order to provide the most complete set of available information.

CLUSTER G. MAPPING THE SUPPLY-DEMAND INTERACTIONS

STEP 14: Customer relationship. Type of relationship between customer and service provider or implementor. The possible types of relationships are personal assistance (human interaction), dedicated personal assistance (dedicating a customer representative to an individual client), self-service (no direct relationship with customer), transactional (through a transaction that can be economic, contractual, etc.), automated (self-service with automated processes), communities (creation of a community of users that communicates through a representative), co-creation (both customer and implementor/service provider generate value). In terms of the duration of the relationship, it can be transactional, long-term, and purpose.

STEP 15: Channels. In the traditional canvas, the communication, distribution, and sales channels comprise a company's interface with customers. Channels are customer touch points that play an important role in the customer experience. In the NAS canvas, channels are the vehicles by which the implementing and beneficiary stakeholders communicate, such as periodical meetings, public participation initiatives, email, social media, formal letters etc.

CLUSTER H: IMPACT

STEP 16: Impact KPIs. List of tangible impacts achieved by the implementation of the measure described through KPIs or key performance indicators that should be used to track the performance and efficiency of the strategy.

The process includes two more additional steps in order to identify the keys for success and barriers faced in building the bridge from design to implementation.

STEP 17. Success conditions: what determined the success for implemented examples?

STEP 18. Existing or potential barriers: elements or factors that could constrain the feasibility or success in the implementation of the NAS strategy.

2.2 Classification and summary table of reported examples

The selected examples span a wide range of initiatives that succeeded in implementing NBS interventions aimed at reducing water related risks while improving integrated water management. A classification into 3 categories has been developed in order to structure the

reporting and facilitate selective reading, while allowing to find commonalities within and between categories.

The defined categories are the following:

- Ecosystem restoration interventions for risk reduction and water resources management at the basin or watershed scale
- Ecosystem restoration interventions for risk reduction and water resources management at the urban scale
- Examples of successful economic instruments to fund Ecosystem restoration interventions for risk reduction and water resources management

Table 1 presents a summary list of the examples reported using the NAS CANVAS framework, and some of the main features including the category as previously defined, the type of risk and the country of implementation. The complete description of the examples is provided in Annex 1.

Nº	NAS Title	Risk	Country
Ecosystem restoration interventions at the watershed or basin scale			
N1	Natural Infrastructure Schemes (NIS) application in North West England	Floods	UK
N2	Protection of river heads through peatland restoration and application of best agricultural practices	Floods, droughts, water quality	UK
N3	NBS for water sources protection for urban supply in Paris	Floods/water quality	France
N4	Flood management plans including river restoration in Navarra, Spain	Floods	Spain
N5	Sustainable conservation agricultural practices in Doñana, Spain	Droughts	Spain
N6	Bistret-Rast - Danube Floodplain restoration	Floods	Romania
N7	Dabuleni -Potelu-Corabia - restoration of the former Potelu Pond	Floods	Romania
N8	Gerai Pond Restoration	Floods	Romania
N9	Natural Park Comana	Floods	Romania
N10	Natural Park Vacaresti	Floods	Romania
N11	Mahmudia-Carasuhat wetland restoration	Floods	Romania
N12	Washington DC Green Infrastructure Stormwater retention strategy	Floods	US
N13	Forest management practices to reduce wildfires in New Mexico	Wildfires and water quality	Mexico
N14	Coastal wetlands and flood damage reduction, US	Coastal floods	US
N15	Mexico Coral Reef Insurance around Cancun and Puerto Morelos	Coastal floods	Mexico
N16	Strategic land protection and revegetation for drought RD in Quito	Droughts	Ecuador
Ecosystem restoration interventions at the urban scale			
N17	Building urban resilience with nature: the case of the Melbourn urban forest	Urban runoff, heatwaves	Australia
N18	Proctor Creek Greenway rail trail in Atlanta	Urban floods	US

N19	NBS for managing stormwater and waste in Malmö, Sweden	Urban floods	Sweden
Successful economic instruments to fund Ecosystem restoration interventions			
EI1	Water funds in Latin America	Water quality, floods droughts	Latin America
EI2	Financing nature-based solutions with climate bonds	---	---
EI3	Eco-Engineering Decision Scaling (EEDS)	---	---
EI4	Payments for ecosystem services (PES)	---	---

3 Successful international examples of funding and financing mechanisms for ecosystem restoration initiatives

Funding refers to the question of who ultimately will pay for the investments made. Financing, on the other hand, refers to mustering the up-front resources needed to be repaid over time by the funding. In some cases, the financing of ecosystem restoration activities comes from the funding source. There is increasing evidence that large-scale restoration activities require private equity or debt. In any case, the funding mechanism defines the revenues of the transaction and constitute the core of an implementation arrangement. In simple terms, the transparency and certainty of the funding mechanism unlock access to non-concessional financing. In turn, the funding mechanisms operate under the definition of the transaction unit (or unit of delivery) which is subject of the economic exchange. Therefore, funding and financing arrangements for ecosystem restoration activities ultimately depend on governing payments for ecosystem services.

3.1 Reporting framework

This second section of the deliverable focuses on Facilities and Instruments aiming to support restoration initiatives. Rather than exhaustive screening, the selection of the example aims at illustrating the relevant reference to explore innovative financing based on solid funding. The Deliverable D7.3 included the guidelines to engineering an implementation arrangement, taking as a reference the five business cases for appraising public investment. The perspective used in D7.3, which focuses on water service delivery rather than the execution of practices or processes for enhancing ecosystem services, is adopted again in this section to analyse examples of operational financing schemes reported in the literature. Some of these examples are analysed further in D7.3 from a service delivery perspective making explicit the link between governance arrangement, financing, and funding.

The examples included in this deliverable are based on the categorization in WP7.1. For this report, we have separated the report for Facilities and Instruments. For reporting Facilities, the first level of categorization of funding and financing options is based on the institutional nature of the source of money, which can be public, private or a combination of both. Additionally, it can be conditional to a catastrophic event or not. Additionally, there are four thematic pillars: 1) climate; 2) nature conservation, 3) disaster risk reduction, 4) infrastructure. Then, our report details the magnitude of the capital managed by the facility and beneficiaries. It concludes with the specific financial instruments for providing capital, and whether the facility has support ecosystem restoration initiatives.

For instruments, the report clarifies the four thematic pillars: 1) climate; 2) nature conservation, 3) disaster risk reduction, 4) infrastructure. Then, the report focuses on the investors,

mechanism and further description. The mechanism describes the transaction or economic interchange between actors ruled by the financing mechanism. The description aims at explaining the positive impact on restoration outcomes. The report finishes with the magnitude of the transaction and whether the instrument has supported restoration activities.

3.2 Summary table of reported examples

Table 2 presents the list of examples of facilities and instruments for the funding and financing of ecosystem restoration activities. The complete description of the listed examples applying a water service delivery perspective is provided in annexes 2 (reporting of facilities) and 3 (reporting of instruments).

Nº	FACILITY
FF1	The global climate change alliance plus (GCCA+)
FF2	European Fund for Regional Development (ERDF)
FF3	Infra. Dev. Collab. Partnership Fund (DevCo)
FF4	Development Cooperation Instrument (DCI)
FF5	Green Africa Power [GAP] – fund
FF6	GuarantCo
FF7	ICF-DP [Infrastructure Crisis Facility –Debt Pool]
FF8	Green Investment Bank
FF9	Urban Climate Change Resilience Trust Fund (UCCRTF)
FF10	Global Environment Facility (GEF)
FF11	Green Climate Fund
FF12	Climate Bonds Initiative
FF13	World Bank Green Bond
FF14	Global Green Growth Institute
Nº	**INSTRUMENTS**
FI1	Suzano Pulp and Paper Green Bond
FI2	Kommuninvest Green Bond
FI3	Coral Reef Insurance policy
FI4	Tropical Forest Conservation Act (TFCA) EEUU
FI5	Madagascar Commercial Debt-for-Nature Swaps
FI6	Amazon Fund
FI7	Environmental Impact Bond for Green Infrastructure
FI8	Forest Resilience bonds

Table 2. List of reported examples of facilities and instruments for the funding and financing of ecosystem restoration activities.

4 Lessons learned from international experiences to bridge the gap towards implementation of ecosystem restoration initiatives

The reporting and analysis of the two sets of examples of successful experiences in funding and financing ecosystem restoration and green infrastructure interventions allowed to draw a series of lessons learned on common factors, success conditions, knowledge gaps and barriers for mainstreaming of these initiatives.

Lessons learned from the analysis of value capture and reporting using the NAS canvas framework

- The ecosystem restoration initiatives aimed for risk reduction report the provision of multiple co-benefits along with the main risk reduction target value. However, in most of the cases there is a lack of reported evidence of the magnitude of those values, i.e. the avoided costs, percentage of damage reduction or the additional income generated in the area. Including some quantitative estimates of the values and impacts generated when reporting existing initiatives is critical to attract the interest of potential investors or promotors looking for evidence of the performance and benefits of this interventions over traditional grey solutions.
- ***Environmental regulation is one of the important drivers promoting the implementation of this type of initiatives***. Furthermore, several interventions are started by public institutions or private companies due to the need of intervention to comply with environmental standards such as water quality thresholds, flood risk management and planning strategies. Particularly in the initiatives within EU, compliance with the Water Framework Directive and the Floods Directive is highlighted as the main driver in a number of examples, e.g. Navarra and Doñana in Spain, Paris in France, North West England in the UK.
- On the **supply side** of the service provision, many of the studied interventions were promoted and implemented by ***public institutions who are responsible for water resources and disaster risk management***, mobilized by the social need to address the risk or subject to national and supra-national environmental regulations (Navarra water plans, urban interventions in Atlanta and Melbourn, interventions in North West UK or interventions in Romania). Examples of ***private initiatives*** are also found where the risk hinders a certain economic activity or sector, or entails very high costs that can be reduced through the intervention (e.g. Doñana Berry project promoted by the agri-food sector, Eau de Paris water supply company, FONAG fund in Quito or Coral Reef insurance in Mexico). ***Water utilities*** seem to be particularly affected by especially water pollution problems, and their avoided treatment costs made the case for investment in water sources protection through NBS in cases like Eau de Paris in the city of Paris or Severn Trents in the Peak District in the

UK. These examples of private initiatives seem to provide further detail on the quantification of avoided costs or economic benefits entailed by the implementation of the measures, mirroring the importance given by the private sector to the quantification and monitoring of the economic case and impacts of the interventions.

- Overall, ***there is a poor reporting of the lifecycle and opportunity costs,*** which are an important piece of information for potential promotors and investors to evaluate the feasibility and interest of the investments in terms of cost/benefits, as well as compared to grey alternatives.
- On the ***demand side*** of the service provision, the ***main beneficiaries are those directly affected by the problem, which usually include citizens and businesses*** (including the agricultural sector) located within the risk affected area. ***Tourists and some indirect private actors such as the insurance sector appear as important indirect beneficiaries***. Successful funding initiatives have arisen from this pool of potential payers, highlighting the formation of private-private partnerships between affected businesses and civil society organisations or public-private partnerships between governmental institutions and private and non-profit actors. An example of private-private partnership is the SAI Platform in Doñana, which involves several stakeholders along the berry value chain (from farmer associations to supermarkets) as well as NGOs. An example of public-private partnership is found among the actors creating the FONAG fund and other water funds in Latin America. Regarding citizen involvement, taxes are the most reported mechanism for citizen funding over tariffs or other types of initiatives. Meanwhile, transfers from public budgets or through grants from i.e. European Programs (e.g. LIFE) constitute another highly reported funding mechanisms.
- Regarding reporting of impacts, only 3 out of 17 examples reported quantified impact indicators showing the effects of the intervention. Most of the remaining examples reported a list of impact indicators and units without quantification, and a minority made no mention of impact at all. This fact highlights once more the ***required efforts on providing evidence of the performance of successful initiatives in the literature that can support the case for ecosystem restoration and green infrastructure.***
- The ***main conditions for success*** reported include a favourable regulatory framework, availability of funds or formation of partnerships for collective funding, support from institutions, cooperation among sectors, developing the experience and standards to overcome institutional biases that favour grey measures, and creation of certified financing mechanisms (such as climate bonds) that attract the interest of investors.
- The ***main barriers*** identified include difficulties to find additional funding to continue the initiative once the initial funding support (grants, donations, public budget) is finished; opposition of the local large agricultural farms and other actors; complex public procurement procedures delaying the process; opposition by farmers whose land would be flooded or other actors suffering side effects.

- The fact that NAS do generate a diversity of co-benefits and that each benefit is linked to a specific flow of revenue generates strong transaction costs that may hinder the emergence of NAS. Therefore, policies to reduce these transaction costs should be needed, such as e.g. by implementing "one-stop-shop" approaches for public subsidies associated with NBS.

Lesson learned: Funding

- In ecosystem restoration activities, the ***typical transaction units (or unit of delivery) usually include hectares of lands managed***, or pounds of pollution kept out of water bodies (Bennett, G., & Ruef, F, 2016). Therefore, the boundary conditions of the transaction in restoring ecosystem services are the property land and water rights.
- ***The design of implementation arrangements requires to address concerns on land ownership***. In the case of US, landownership usually operates upon individual rights. In other countries, land ownership intertwines with public, collective and communitarian organizational forms. In this case, successful initiatives of restoration rely on years of building capacity and trust between individual landowners, organized communities and NGOs (Bremer, L. L, et.al, 2014).
- However, ***the existence of motivated buyers perceiving ecosystem service scarcity drives the emergence of green markets and deals.*** The development of markets is rather complex and depends on several characteristics. In the case of stormwater markets, the conditions include (i) proportional to the number of buyers and sellers (ii) clear units of trade (e.g., m3 of runoff), and the regulation of credits as permanent or time-bound (Bassi, A., et.al., 2017).
- So far, ***the most successful organizational arrangement is the Investment in Watershed program with a single downstream beneficiary*** (e.g., utility) (Vogl, A.L., et.al., 2017). Watershed arrangement is the most mature in terms of transactions and geographical distribution (US$24.7 billion in 62 countries in 2015). Policy and legal interventions can create a single beneficiary for structuring watershed services (Vogl, A.L., et.al., 2017). Currently, payments for watershed arrangements rather depend on the execution of practices (e.g., implementing specific land use) than on the performance (improvement in water quality).
- China is the frontrunner in structuring watershed agreements, structured as indirect-user-based funding brokered by the Government. The Chinese Natural Forest Conservation Program (NFCP) and the Sloping Land Conversion Program (SLCP) are the largest payment for ecosystem services in the world (Ouyang et.al., 2016). Additionally, there is an increasing number of Watershed programs in Latin America, where the most effective funding strategy relies on public sources and utilities (Bremer et.al, 2016). The revenues attracted by 16 Watershed programs between the period 2013-2014 amounted up to 62.2US Millions, from which 25.3% came from public taxes (government-based) and 23%

came from tariffs linked to utilities (user-based). The participation of revenues from the private sector as direct user-based is rather discrete (8,5%). In Europe the second pillar of the common agricultural included the so-called agro-environment climate measures for a budget of € 27 billions. These measures partially addressed water related objectives such as the improvement of water quality or the reduction of soil erosion.

- ***The legislation was critical for guaranteeing public revenues for water funds in Latin America***. Typically, authorities enact laws requiring a portion of tariff utility to feed water funds (Bremer et.al, 2016). The enactment of binding legislation also enabled the structuring of more complex markets. In the case of Stormwater Retention Credits (SRCs) in Washington D.C., project developers in the D.C area must use Green Infrastructure to retain stormwater runoff, but they have the option to meet up to the 50% of their requirement off-site using SRCs (Bassi et.al., 2017).
- ***The success of markets or credit trading programs is due to the credibility of the enforcing mechanism to mitigate the pollution***. However, these are only fully operating in the United States, Australia, and Mexico (Vogl, A.L., et.al., 2017).
- ***The definition of metrics is a critical point to structure a transaction exchanging fungible services for money.*** There is a trade-off between setting metrics that reduce transaction and adopting those which capture the complexity of the service to be provided.

Lesson learned Financing

- ***There is a financing gap for green finance in general, and for NBS in particular***. Unlocking private financing is a major challenge (Alliance, 2013; UNEP, 2014). NBS bankability depends on appropriate risk mitigation for investors. Green financing is mainly captured by the energy sector, while water supply and resilient infrastructure are less covered by green finance initiatives. Monitoring mechanisms and monetization of benefits remain underdeveloped (UNEP, 2014).
- ***There is also a lack of capacity to link up finance with projects meeting fund requirements***. For example, Mechanisms for Retribution for Ecosystem Services Peru (water fund) have accumulated 22USMillions that require the development of technical capabilities in the public and private sector to be properly executed. There is also evidence of lack of technical capability for structuring projects able to access existing sustainable financing in Asia and the Pacific (ADB 2015). Combining government funds with development finance can create enabling conditions for green project private investment.
- ***Financers and institutional investors perceived NBS as highly risky investments.*** There is a high perception of risk of preconstruction and construction phases, and first years of operation. Private financing can still play a role using refinancing vehicles, allowing entry options to institutional investors in less risky periods (e.g., post-completion of construction) (Mehta, A, 2017).

- ***The most sophisticated financing mechanisms imply significant transaction costs, mainly suitable for large-scale landscape interventions.*** Structuring Impact Bonds for attracting investors is only efficient for transactions beyond three million dollars (CPIC, 2019).
- ***There is the idea that investors usually prefer short-term investments.*** However, there is a sustainability-oriented market. They are willing to invest in long-term investments that match with ecosystem cycles (CPIC, 2019a).
- ***There are two key aspects to reduce transaction costs for restoring ecosystems.*** First, the investment must be ready at the technical level. Second, organizations interested in unlocking private financing must develop better understanding of the existing banking techniques and structures that are familiar to investors (CPIC, 2019b).
- ***Investors speak in terms of "asset classes"*** (grouping of investments with similar characteristics: e.g., equities, fixed incomes, and cash equivalence). There is a challenge to bring this language in a meaningful way in restoring ecosystems (CPIC, 2019b).
- ***The restoration sector can use banking techniques and structures used in the energy transition as a reference.*** There is no need to reinvent the wheel. There is the possibility to learn from cities and the boom of green infrastructure and financing. Integrated landscape investments might be the most relevant approach for Water Security. In these structures, local actors are merged to raise enough capital (CPIC, 2019b).

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6 Annexes

6.1 Annex 1. Detailed reported examples of NAS described through the NAS canvas framework

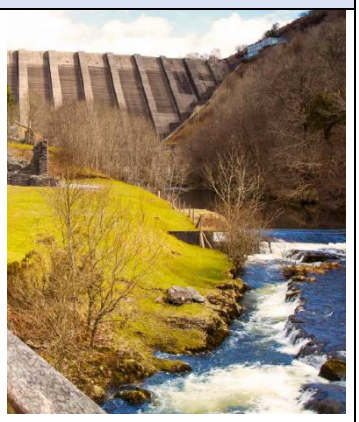
Examples of successful watershed scale natural assurance scheme interventions

NAS N1	Natural Infrastructure Schemes, example from the UK
CLUSTER A. FLOW OF SERVICES	
1. PROBLEM TO BE ADDRESSED	Flood risks and water quality problems
2. VALUE PROPOSITION	
2A. Primary Value	Avoided costs: the downstream costs of river flooding and water contamination are in excess of £2.4 billion per year. This includes spending by water companies, electricity network companies, transport authorities and the Environment Agency, and insurance pay outs. The saved implementation costs as compared to business as usual alternatives are estimated in £4.7 million. Total avoided costs are £2,404.7 million. The insured flood loss from Storm Desmond in 2015 was between £520 and £662 million, resulting from 24,000 property claims; and local businesses: To protect their own assets, where permanent defences are not viewed as cost beneficial, the alternative is to use sandbags or install temporary flood defences, which have a 20 to 30 per cent failure rate.
2B. Secondary Value	Reduced implementation costs: The cost of raising a small substation by 1.2 metres is £2 million, while relocation would cost £2.7 million.
CLUSTER B: REGULATORY CONTEXT	
3. REGULATION	Governments should use smart regulation to remove barriers and encourage behaviour change.
CLUSTER C: MAPPING THE SUPPLY	
4: WHO IMPLEMENTS	Farmers
5. KEY ACTIVITIES:	Changes to agricultural practices to improve soil, e.g. minimum tillage farming. • Changes to land use not adjacent to rivers, e.g. bunds and tree planting. • Changes to land adjacent to rivers, e.g. riparian strips, attenuation ponds and treatment wetlands. • Modifications to drainage infrastructure to increase soil moisture levels, e.g. blocking subsoil pipes or grips (surface channels). • Alterations to river courses, e.g. remeandering, measures to reconnect rivers with their floodplains. • Creation of new structures in rivers, e.g. woody debris and log jams.
6. KEY RESOURCES	Funds, knowledge, skilled staff for construction and maintenance.
7. KEY PARTNERS	Water companies, infrastructure operators, public agencies and farmers
8A. Primary service	Improvements in the flood protection of vital infrastructure, at lower cost than current business as usual approaches.
8B. Secondary services	Improvements to the natural environment through the creation of new natural infrastructure on farmland; a new, commercial revenue stream for upland farmers who might otherwise struggle to stay in business; improved water quality, increased carbon storage, and increased wildlife on the moors.
CLUSTER D: MAPPING THE COSTS OF THE SERVICE	
9. COST STRUCTURE	

9A. Lifecycle costs	Estimated NIS costs for sellers £6,532,650 over 15 years to create and maintain it.
9B. Opportunity costs	Lost income from portion of land taken out of agricultural use, estimated within the LCC.
CLUSTER E: MAPPING THE DEMAND	
10: WHO OWNS THE PROBLEM	Network Rail, the local electricity supplier, the local water and sewerage company, the local authority responsible for maintaining roads, the insurance sector and local businesses.
11: CUSTOMER SEGMENTS	
11A. Direct beneficiaries	All the citizens, business and inhabitants of the downstream flood plain area.
11B. Clients	-Network Rail: pays compensation to train operating companies for disruption to passenger services caused by flooding. This typically amounts to millions of pounds every year. -local electricity supplier: exposed to potentially huge costs for assets which cannot be adequately or cost effectively protected from flood risk by hard flood defences. -local water and sewerage company: cost of removing pollutants from water to follow WFD. -local authority responsible for maintaining roads: the maintenance of local roads is the responsibility of local authorities. This money may be raised from local taxpayers or funded by central government grants. -The insurance sector: Insurers have been exposed to huge costs from severe weather events.
11C. Indirect beneficiaries	Citizens in the downstream area.
CLUSTER F: MAPPING THE ABILITY/WILLINGNESS TO PAY	
12. REVENUE STREAMS	The farmers would earn £15,658 each in profit per year for 15 years.
13: FUNDING: Please specify whether the funding for the income streams is coming from (or a mixture of):	

13A. Tariffs	No
13B. Taxes	No
13C. Transfers	buyers would otherwise spend on traditional solutions,
13D. Private funds or investment	No
FINANCING	Not reported
CLUSTER G. MAPPING THE SUPPLY-DEMAND INTERACTIONS	

14: CUSTOMER RELATIONSHIP	Personal assistance
15: CHANNELS	Contracts between farmers (implementors) and payers or funders.
CLUSTER H: IMPACT	
16.IMPACT (KPIs)	Not reported
ADDITIONAL STEPS	
17. SUCCESS CONDITIONS	Improve local planning and procurement of flood risk mitigation; Provide research funding to increase knowledge about, and reduce costs of, natural flood management; Introduce quantifiable objectives for environmental restoration in the forthcoming 25 year plan for the environment; Technically viable, provable cost savings, Robust commercial framework.
18. BARRIERS	Not reported
SOURCE	National Trust and Green Alliance (2017) Natural Infrastructure Schemes in practice. How to create new markets for ecosystem services from land
Documented by	Beatriz Mayor – ICATALIST & Roxane Marchal - CCR

NAS N2	Protection of river heads through peatland restoration and application of best agricultural practices	
CLUSTER A. FLOW OF SERVICES		
1. PROBLEM TO BE ADDRESSED:	Diffuse pollution from agriculture and peat-land degradation increasing flood risk West Midlands region in UK. Currently around 500 water bodies do not meet the good status under the WFD standards. This region has a strong industrial tissue and intensive agriculture that leads to important diffuse pollution as well as aquatic ecosystem degradation. Particularly, the Peak District national park has seen progressive degradation of the natural peat-lands that constitute reach local ecosystems. Meanwhile, the main water supply, Severn Trents, faces important challenges and costs to treat the degraded water.	
2. VALUE PROPOSITION		
2A. Primary Value	Avoided flood costs (not reported), reduced water treatment costs (not reported).	
2B. Secondary Value	Carbon sequestration (tons CO2), increased number of tourists (total collected).	
CLUSTER B: REGULATORY CONTEXT		
3. REGULATION	The Water Framework Directive and the national legislation prescribe water quality standards that need to be met by drinking water and wastewater streams, as well as for surface and groundwater bodies.	
CLUSTER C: MAPPING THE SUPPLY		
4: WHO IMPLEMENTS	Water supply company (Severn Trent)	
5. KEY ACTIVITIES:	Moors for the future project: 1) peat-land restoration through recovery of the natural vegetation, erosion detention barriers and tree plantation. 2) Changes in agricultural practices (change of metaldehyde for ferric phosphate which is less harmful), changes in land use and infrastructure to reduce diffuse pollution.	
6. KEY RESOURCES	Specialized technicians (currently 8 agronomic engineers in staff and external technicians supporting activities with river and animal protection foundations (Rivers Trust and Widelife Trusts).	
7. KEY PARTNERS	Parque Nacional Peak, la Dirección General del Patrimonio Nacional (National Trust), la Agencia de Medio Ambiente (Environment Agency), United Utilities (otra empresa de agua) y organizaciones locales.	
8A. Primary service	Improvement in water quality and flood risk reduction	
8B. Secondary services	Biodiversity recovery, carbon capture, water treatment cost reduction,	
CLUSTER D: MAPPING THE COSTS OF THE SERVICE		
9. COST STRUCTURE		
9A. Lifecycle costs	Not reported	
9B. Opportunity costs	Not reported	
CLUSTER E: MAPPING THE DEMAND		
10: WHO OWNS THE PROBLEM	Water supply company (Severn Trent), citizens, River Basin Authority, managers of the Peak District park	
11: CUSTOMER SEGMENTS		
11A. Direct beneficiaries	Citizens, Water supply company (Severn Trent), ecosystems, River Basin Authority, managers of the Peak District park	

11B. Clients	Water supply company (Severn Trent), citizens (through water tariffs),
11C. Indirect beneficiaries	Toursists, conservationists,
CLUSTER F: MAPPING THE ABILITY/WILLINGNESS TO PAY	
12. REVENUE STREAMS	Potential revenues could be fees from tourists.
13: FUNDING: Please specify whether the funding for the income streams is coming from (or a mixture of):	
13A. Tariffs	Water tariff paid by users connected to the supply network. An extra component has been added to the tariff to fund this initiative after exhaustive consultations to service users about their willingness to pay for the initiative.
13B. Taxes	Not reported
13C. Transfers	Payment by the water supply company (Severnt Trents) to farmers of up to 8 £/ha to change the chemical input, and up to 5,000 £ per farm to support any investments in infrastructure and land use changes (such as crop changes). Severn Trents provides additional small subsidies to farmers through the "Cash for Catchments" program, as a support to small projects led by the local communities to restore local ecosystem, preserve biodiversity or restore natural systems for flood control, river restoration and control of invasive species. The Water Supply company has used their own funds, and received support from OFWAT (water economic regulation organism), European funds through LIFE projects (70% financed), and public subsidies from the British Environmental Agency. Fund contributions provided by farmers.
13D. Private funds	No
FINANCING	Not reported
CLUSTER G. MAPPING THE SUPPLY-DEMAND INTERACTIONS	
14: CUSTOMER RELATIONSHIP	Personal advise, transactional (through a payment economic transaction).
15: CHANNELS	Negotiators, meetings with farmer associations, consultations and surveys to water users
CLUSTER H: IMPACT	
16.IMPACT through KPIs	Number of water bodies meeting the water quality standards (Nº), Number of water treatment plants meeting the water quality standards (Nº), Agricultural surface adopting new agricultural practices (ha or %).
ADDITIONAL STEPS	
17. Success conditions	Not reported
18. Existing or potential barriers	Some of the implementing partners are suffering from public investment reductions. Meanwhile, there will be no access to European funding after Brexit, and thus Severn Trent faces the challenge to find alternative co-funding sources.
SOURCE	The Nature Conservancy and MITECO (2019) Soluciones basadas en la naturaleza para la gestión del Agua en España.; EC (2016) An impact evaluation framework to support planning and evaluation of nature-based solutions projects.
Documented by	Beatriz Mayor - ICATALIST

NAS N3	NBS for water sources protection for urban supply in Paris
CLUSTER A. FLOW OF SERVICES	
1. PROBLEM TO BE ADDRESSED	High levels of diffuse pollution coming from agriculture affecting groundwater quality in the aquifers supplying 50% of Paris urban water supply.
2. VALUE PROPOSITION	
2A. Primary Value	Reduced water treatment costs thanks to lower groundwater pollution
2B. Secondary Value	New market opportunities for farmers;
CLUSTER B: REGULATORY CONTEXT	
3. REGULATION	CAP, WFD, Nitrates Directive,
CLUSTER C: MAPPING THE SUPPLY	
4: WHO IMPLEMENTS	Initiative: Water supply company (Eau de Paris); Measures: farmers
5. KEY ACTIVITIES:	Public land purchase and rental to farmers under the condition of the application of sustainable agricultural practices (organic agriculture or extensive farming). Practices include reduced use of fertilizers, crop rotation and diversification, including nitrate fixing crops).
6. KEY RESOURCES	Funds and financing mechanisms to implement the measure; favourable regulation that facilitates an additional/alternative funding stream through payments for ecosystem services; knowledge and capacity building on most suitable agricultural practices and how to apply them in the field; human resources to carry out the trainings, assistances and information campaigns; investment by farmers (infrastructure, inputs and machinery) to introduce new crops and adapt the farms.
7. KEY PARTNERS	Farmers, farmers associations, Eau de Paris, Municipality of Paris,
8A. Primary service	Protection of water sources, reduction of water pollution
8B. Secondary services	Increase in water quality, higher water availability, lower water treatment costs, promotion of new agricultural markets,
CLUSTER D: MAPPING THE COSTS OF THE SERVICE	
9. COST STRUCTURE	
9A. Lifecycle costs	1 Euro symbolic cost for farmers for renting the lands acquired by Eau de Paris.
9B. Opportunity costs	Not reported
CLUSTER E: MAPPING THE DEMAND	
10: WHO OWNS THE PROBLEM	Municipality of Paris, Citizens of Paris, water supply company (Eau de Paris)
11: CUSTOMER SEGMENTS	
11A. Direct beneficiaries	Citizens, Water supply company (Eau de Paris),
11B. Clients	Citizens, Water supply company (Eau de Paris), farmers
11C. Indirect beneficiaries	Municipality of Paris
CLUSTER F: MAPPING THE ABILITY/WILLINGNESS TO PAY	
12. REVENUE STREAMS	Increased revenues for farmers from the access to new agricultural markets and the connection with new clients (i.e. local schools and social canteens).
13: FUNDING: Please specify whether the funding for the income streams is coming from (or a mixture of):	
13A. Tariffs	Water tariff paid by the citizens of Paris
13B. Taxes	No

13C. Transfers	Subsidies from the CAP policy, Pilar 2, to promote changes in agricultural practices, complemented with payments from different projects funded by the Seine-Normandie River Basin Authority	
13D. Private investment	No	
FINANCING	Not reported	
CLUSTER G. MAPPING THE SUPPLY-DEMAND INTERACTIONS		
14: CUSTOMER RELATIONSHIP	Direct assistance	
15: CHANNELS	Trainings, information campaigns, notifications	
CLUSTER H: IMPACT		
16.IMPACT through KPIs	Percentage of cultivated area applying organic agricultural practices (%); Water quality improvement (%)	
ADDITIONAL STEPS		
17. SUCCESS CONDITIONS	Not reported	
18. EXISTING OR POTENTIAL BARRIERS	Due to the EU restrictions to public subsidies, Eau de Paris is not allowed to do payments for ecosystem services with their own funds, which constraints the continuity of the initiative. They are currently participating in an INTERREG project funded by the EU with partners from the UK and France to develop a common approach for payments for ecosystem services (CPES – Channel Payment for Ecosystem Services).	
SOURCE	The Nature Conservancy and MITECO (2019) Soluciones basadas en la naturaleza para la gestión del Agua en España.; EAU de Paris (2017) Stratégie protection de la ressource. http://www.eaudeparis.fr/uploads/tx_edpevents/Brochure_strategie_protection_ressource.pdf	
Documented by	Beatriz Mayor - ICATALIST	

NAS N4	Flood management plans including river restoration in Navarra, Spain
CLUSTER A. FLOW OF SERVICES	
1. Problem to be addressed:	Flood risk in a region with abundant rainfall, with extreme events expected to increase due to climate change.
2. VALUE PROPOSITION	
2A. Primary Value	Reduced impacts from flash floods and slow floods, (Value avoided costs: Not reported).
2B. Secondary Value	Not reported
CLUSTER B: REGULATORY CONTEXT	
3. REGULATION	WFD, Floods Directive, National River Basin Planning, Navarra River Basin Management Plan,
CLUSTER C: MAPPING THE SUPPLY	
4: WHO IMPLEMENTS	Navarra River Basin Authority
5. KEY ACTIVITIES:	Climate change monitoring system, early warning system for floods, adaptive management of water, forests, Flood protection plans for 16 municipalities (including flood risk and hazard maps), river restoration project with measures including river bed and river banks protection within the 10 years return period area, establishment of 'preferential river area' and gradual regulations within the 500 years return period area.
6. KEY RESOURCES	Funds, technicians and water planners, early warning system technology,
7. KEY PARTNERS	River Basin Authority, Regional and National Government, engineering companies, environmental consultancies,
8A. Primary service	Flood risk reduction and impact mitigation.
8B. Secondary services	Good water management, ecosystem improvements, recovery of forestal mass, increased carbon sequestration,
CLUSTER D: MAPPING THE COSTS OF THE SERVICE	
9. COST STRUCTURE	
9A. Lifecycle costs	Implementation and maintenance of measures, development of plans,
9B. Opportunity costs	Not reported
CLUSTER E: MAPPING THE DEMAND	
10: WHO OWNS THE PROBLEM	Navarra River Basin Authority, inhabitants of Navarra Region,
11: CUSTOMER SEGMENTS	
11A. Direct beneficiaries	Navarra River Basin Authority, inhabitants of Navarra Region,
11B. Clients	Inhabitants of Navarra Region and the whole of Spain Budget) and water tariffs through taxes (the RBA budget comes from the National
11C. Indirect beneficiaries	Tourists, ecosystems,
CLUSTER F: MAPPING THE ABILITY/WILLINGNESS TO PAY	
12. REVENUE STREAMS	No
13: FUNDING: Please specify whether the funding for the income streams is coming from (or a mixture of):	

13A. Tariffs	No
13B. Taxes	Indirectly, taxes paid by all Spanish population that go to the national budget.
13C. Transfers	Public funds from the national government, supported with European funds from the project "H2OGurea, Gestión integrada de cuencas vertientes ransfronterizas", and with funds from the European Fund for Regional Development (FEDER) through the Operative Program for Land Cooperation Spain- France-Andorra (POCTEFA 2014-2020).
13D. Private funds or investment	Not reported
FINANCING	Not reported
CLUSTER G. MAPPING THE SUPPLY-DEMAND INTERACTIONS	
14: CUSTOMER RELATIONSHIP	Transactional, automated through the tax collection systems
15: CHANNELS	Emails, notifications via the Legislation Bulletin (BOE)
CLUSTER H: IMPACT	
16.IMPACT through KPIs	Not reported
ADDITIONAL STEPS	
17. Success conditions	Not reported
18. Barriers	Not reported
SOURCE	The Nature Conservancy and MITECO (2019) Soluciones basadas en la naturaleza para la gestión del Agua en España.
Documented by	Beatriz Mayor - ICATALIST

NAS N5	Sustainable conservation agricultural practices in Doñana, Spain
CLUSTER A. FLOW OF SERVICES	
1. PROBLEM TO BE ADDRESSED	Aquifer overexploitation leading to environmental degradation and water supply constraints. The Doñana wetlands have an extraordinary biodiversity richness, hosting over 6 million migratory bird species. The regions also hosts the biggest berry production area within Spain fed with groundwater from the underlying aquifer. As a result of this activity among other factors, the water table levels have dramatically decreased in the last years seriously affecting the integrity of one of the most important RAMSAR sites as well as of more than 200,000 people involved in the berry value chain.
2. VALUE PROPOSITION	
2A. Primary Value	Reduce potential impacts from future droughts by recovering the aquifer levels and ensuring a back up resource (Value: avoided losses due to droughts or to groundwater depletion, NA).
2B. Secondary Value	Wetland ecosystem restoration (Value: revenues from tourism, NA), maintenance of groundwater quality (reduced water treatment costs, NA), maintenance of community livelihoods around the local berry value chain (Value: average rent, NA),
CLUSTER B: REGULATORY CONTEXT	
3. REGULATION	Local and regional authorities have worked closely with the project promoter (Sustainable Agriculture Initiative Platform, SAI Platform) to create the regulatory conditions required for implementation of the project.
CLUSTER C: MAPPING THE SUPPLY	
4. WHO IMPLEMENTS	SAI Platform, Farmers
5. KEY ACTIVITIES:	The Doñana Berry project promotes the adoption of sustainable conservation agricultural practices that promote lower water use by local and nearby farmers. It involved several capacity building programs for farmers to learn this practices, as well as the provision of measuring and monitoring tools and devices.
6. KEY RESOURCES	Technology, devices and infrastructure, human resources (trainers, educators, specialists in conservation agriculture, project managers and economists).
7. KEY PARTNERS	project partners including SAI Platform, WWF Spain, food companies and supermarkets such as Tesco, Danone, BerryWorld, Coop and Iberfruta, among others. River Basin Authority and Regional government (Junta de Andalucia),
8A. Primary service	Reduced potential impacts from future droughts by recovering the aquifer levels and ensuring a back up resource.
8B. Secondary services	Wetland ecosystem restoration, biodiversity protection, maintenance of groundwater quality, maintenance of community livelihoods around the local berry value chain, maintenance of tourism, climate regulation, local farmers empowerment
CLUSTER D: MAPPING THE COSTS OF THE SERVICE	
9. COST STRUCTURE	
9A. Lifecycle costs	Cost of implementation of the practices: acquisition of materials, trainings, changes in infrastructure, acquisition of measuring devices and technologies.
9B. Opportunity costs	Potential profits made by the supermarkets and project partners from alternative investments or allocation of the funds.
CLUSTER E: MAPPING THE DEMAND	
10: WHO OWNS THE PROBLEM	Farmers and companies along the berry value chain, the whole society (loss of ecosystem services), Regional authorities facing fines from the EU, River basin authority managing the aquifer
11: CUSTOMER SEGMENTS	
11A. Direct beneficiaries	Regional authorities facing fines from the EU, River basin authority managing the aquifer

11B. Clients	Value chain companies funding the project, farmers who carry out investments in their lands,
11C. Indirect beneficiaries	The whole society, tourists, environmental conservationists
CLUSTER F: MAPPING THE ABILITY/WILLINGNESS TO PAY	
12. REVENUE STREAMS	Potentially fees from tourists visiting the park or the berry fields.
13: FUNDING	
13A. Tariffs	No
13B. Taxes	No
13C. Transfers	Contributions from Coca Cola Foundation in 2017 and 2018.
13D. Private funds or investment	Contributions from the project partners including SAI Platform, WWF Spain, food companies and supermarkets such as Tesco, Danone, BerryWorld, Coop and Iberfruta, among others.
FINANCING	Not reported
CLUSTER G. MAPPING THE SUPPLY-DEMAND INTERACTIONS	
14: CUSTOMER RELATIONSHIP	Indirect longterm relationship
15: CHANNELS	Personal assistance, meetings, letters and emails, phone calls, apps
CLUSTER H: IMPACT	
16.IMPACT through KPIs	Not reported
ADDITIONAL STEPS	
17. Success conditions	Creation of the SAI Platform, with support of international organisations (WWF Spain) and with support of the River Basin Authority and Regional government (Junta de Andalucia). Cooperation and interest from farmers to implement the practices.
18. Barriers	Need for additional funding to ensure the continuity of the project.
SOURCE	The Nature Conservancy and MITECO (2019) Soluciones basadas en la naturaleza para la gestión del Agua en España.
Documented by	Beatriz Mayor - ICATALIST

NAS N6	Dabuleni -Potelu-Corabia - restoration of the former Potelu Pond, Romania
CLUSTER A. FLOW OF SERVICES	
1. PROBLEM TO BE ADDRESSED	Floods, Desertification, Erosion
2. VALUE PROPOSITION	
2A. Primary Value	Protection against floods and droughts Improved groundwater quantity and quality
2B. Secondary Value	Support local economy diversification and development Prevent erosion, improve soil formation, purify water and supply groundwater bodies Support the conservation of habitats and species, including many birds
CLUSTER B: REGULATORY CONTEXT	
3. REGULATION	Public-Public Cooperation juridical aspects PPP legislation Expropriation legislation Land use change legislation Cadastre / unclear land ownership
CLUSTER C: MAPPING THE SUPPLY	
4: WHO IMPLEMENTS	Ministry of Waters &Forests/ANAR / Local Authorities NGO's
5. KEY ACTIVITIES:	Restore the former pond Potelu
6. KEY RESOURCES	Data availability (soil, water, cadastre, ownership, topography, etc) Public-Public cooperation protocol Political willingness (ASD to revise the leasing contracts) Revise legislation about land use category change EU Funds
7. KEY PARTNERS	Local authorities County Councils National Administration Romanian Waters (ANAR) Ministry of Agriculture and Rural Development (MARD) The Agency for the State Domains (ADS) Ministry of Environment Ministry of Waters & Forests
8A. Primary service	Protection against floods and droughts Improved groundwater quantity and quality
8B. Secondary services	Support local economy diversification and development Prevent erosion, improve soil formation, purify water and supply groundwater bodies Support the conservation of habitats and species, including many birds
CLUSTER D: MAPPING THE COSTS OF THE SERVICE	
9. COST STRUCTURE	
9A. Lifecycle costs	Will be further elaborated in the Danube Floodplain projects
9B. Opportunity costs	Not reported
CLUSTER E: MAPPING THE DEMAND	
10: WHO OWNS THE PROBLEM	Ministry of Waters &Forests (Flood Directive and Water Framework Directive) and Ministry of Agriculture and Rural Development (Strategy for drought prevention and management)

11: CUSTOMER SEGMENTS	
11A. Direct beneficiaries	Local population - villages along the Danube Local authorities The government
11B. Clients	Clients for fishing permits Local businesses and local tourism Tourists for services provided by local authority or private companies from the area
11C. Indirect beneficiaries	Local businesses (protection and sustainability) Local authorities (more taxes collected) Local biodiversity/ Ministry of Environment (Birds Directive and Ramsar Convention)
CLUSTER F: MAPPING THE ABILITY/WILLINGNESS TO PAY	
12. REVENUE STREAMS	Fees for renting land/for providing various services Accommodation and food tourists/birdwatchers/fisherman Local handicraft/local food products
13: FUNDING: Please specify whether the funding for the income streams is coming from (or a mixture of):	
13A. Tariffs	Entry fees (Comana Natural Park); fees for various services
13B. Taxes	Taxes for fishing permits Taxes for local tourism
13C. Transfers	No
13D. Private investment	No
FINANCING	Loans (EBRD, World Bank) EU Funds (available through the Operational Program for Large Infrastructure 2014-2020 , priority axis 5- Promotion of climate change adaptation, prevention and management of risks and Life – the multiannual work program 2018-2020)
CLUSTER G. MAPPING THE SUPPLY-DEMAND INTERACTIONS	
14: CUSTOMER RELATIONSHIP	Transaction
15: CHANNELS	Direct meetings private & public stakeholders Promotion at local/county/national level
CLUSTER H: IMPACT	
16.IMPACT through KPIs	Development of local businesses Increasing number of tourists Number of permanent inhabitants Increased biodiversity (number of birds, fishes population, number of plants/habitats) Groundwater quantity and quality
ADDITIONAL STEPS	
17. Success conditions	Local community drive and available funding /financing options
18. Barriers	Opposition of the local large agricultural farms and of the Agency for State Domains
SOURCE	BDG (2018) Focus group Grojdibodu,December 4th, 2018 and workshop 2 RBA Jiu, December 5th, 2018
Documented by	Florentina Nanu - BDG; Ioana Groza - BDG; Albert Scrieu - GeoEcomar

NAS N7	Bistret-Rast - Danube Floodplain restoration, Romania
CLUSTER A. FLOW OF SERVICES	
1. PROBLEM TO BE ADDRESSED	Frequent floods affecting populations along the dikes, lakes, ponds, driange channels, irrigation channels and pumping station, roads networks, etc
2. VALUE PROPOSITION	
2A. Primary Value	Protection against floods. Damage cost value: flood damages in 2006 (approx. 100 mil Euro), droughts with impact on people and agricultural activities
2B. Secondary Value	Restore the Danube floodplain Local development of tourism and fishing activities
CLUSTER B: REGULATORY CONTEXT	
3. REGULATION	Flood Directive and Water Framework Directive
CLUSTER C: MAPPING THE SUPPLY	
4: WHO IMPLEMENTS	ANAR
5. KEY ACTIVITIES:	Reconection of the Danube floodplain Not yet decided how it will implemented
6. KEY RESOURCES	Political support Previous studies available Local support Knowledge about flood protection measures and their implementation
7. KEY PARTNERS	Local administrations Local farmers EPA NGO's
8A. Primary service	Flood protection
8B. Secondary services	Biodiversity development Development of tourism and economic activities based of natural resources provided by the wetland and the water
CLUSTER D: MAPPING THE COSTS OF THE SERVICE	
9. COST STRUCTURE	
9A. Lifecycle costs	Not reported
9B. Opportunity costs	Not reported
CLUSTER E: MAPPING THE DEMAND	
10: WHO OWNS THE PROBLEM	ANAR
11: CUSTOMER SEGMENTS	
11A. Direct beneficiaries	Local people, local settlements, agricultural land (2006 flood damages estimated at 100 mil Euro)
11B. Clients	
11C. Indirect beneficiaries	Local people, houses and the local economic activities
CLUSTER F: MAPPING THE ABILITY/WILLINGNESS TO PAY	
12. REVENUE STREAMS	Fishing & aquaculture development Eco-tourism (natural habitat, birds) Local handicrafts (products from reed)
13: FUNDING: Please specify whether the funding for the income streams is coming from (or a mixture of):	

13A. Tariffs	No
13B. Taxes	No
13C. Transfers	EU funds and national budgets
13D. Private funds	No
FINANCING	Loans
CLUSTER G. MAPPING THE SUPPLY-DEMAND INTERACTIONS	
14: CUSTOMER RELATIONSHIP	Not reported
15: CHANNELS	Direct meeting with local stakeholders
CLUSTER H: IMPACT	
16.IMPACT through KPIs	Number of people protected people, houses, hectares of agricultural land, infrastructure
ADDITIONAL STEPS	
17. Success conditions	Not reported
18. Barriers	Local farmers opposition
SOURCE	NAIAD Workshop 2, ABA Jiu, December 5th, 2018
Documented by	Florentina Nanu - BDG; Ioana Groza - BDG; Albert Scrieu - GeoEcomar

NAS N8	Gerai Pond Restoration, Romania
CLUSTER A. FLOW OF SERVICES	
1. PROBLEM TO BE ADDRESSED	The need to create and ensure the protection and the conservation of threatened bird species - red duck (Aythya nyroca) and pygmy cormorant (Phalacrocorax pygmaeus)
2. VALUE PROPOSITION	
2A. Primary Value	Protection of extinction threatened species in Europe [Red duck (Aythya nyroca) and pygmy cormorant (Phalacrocorax pygmaeus)]
2B. Secondary Value	Ancillary benefits for the people living in the area, such as grassland suitable for grazing Increased permanent biomass Beekeepers came to pick mint Fishing can be practiced in some parts of the area Increased Eco-tourism - Eco-Education
CLUSTER B: REGULATORY CONTEXT	
3. REGULATION	Drainage of the former Danube floodplain and its use for agricultural activities
CLUSTER C: MAPPING THE SUPPLY	
4: WHO IMPLEMENTS	Implementation was done by SOR & WWF Romania
5. KEY ACTIVITIES:	Persuade the local citizens, owners of the plots to give up the land
6. KEY RESOURCES	Data availability (cadastre, ownership, topography) EU Funds - Life program
7. KEY PARTNERS	Local authorities Izlaz and Garcov villages EPA Olt & EPA Telorman WWF Romania Romanian Ornithological Society National Administration Romanian Waters (ANAR) Ministry of Environment
8A. Primary service	Habitat conservation and protection of birds
8B. Secondary services	Providing grazing option in dry periods
CLUSTER D: MAPPING THE COSTS OF THE SERVICE	
9. COST STRUCTURE	
9A. Lifecycle costs	Maintenance costs not available
9B. Opportunity costs	Ecological restoration of the habitats (nesting and feeding) for hydrophilic species like the red duck (Aythya nyroca) and pygmy cormorant (Phalacrocorax pygmaeus), both being threatened species
CLUSTER E: MAPPING THE DEMAND	
10: WHO OWNS THE PROBLEM	Ministry of Envrionment - Bird Directive
11: CUSTOMER SEGMENTS	
11A. Direct beneficiaries	Local communities Fauna and Flora
11B. Clients	Not aplicable in this situation
11C. Indirect beneficiaries	Local citizens Husbandry activities in the area Beekeepers
CLUSTER F: MAPPING THE ABILITY/WILLINGNESS TO PAY	

12. REVENUE STREAMS	Number of birds nests Resources for grazing in the dry periods Beekeepers
13: FUNDING: Please specify whether the funding for the income streams is coming from (or a mixture of):	
13A. Tariffs	No
13B. Taxes	No
13C. Transfers	Life program - grant 65 000 Euro
13D. Private investment	No
FINANCING	Not reported
CLUSTER G. MAPPING THE SUPPLY-DEMAND INTERACTIONS	
14: CUSTOMER RELATIONSHIP	Long-term
15: CHANNELS	Internet, Media, Press
CLUSTER H: IMPACT	
16.IMPACT through KPIs	The number of nests increased
ADDITIONAL STEPS	
17. Success conditions	The successfull implementation was enabled by the good cooperation between different sectors (NGO, local authorities), public communication and meetings organised with local stakeholders
18. Existing or potential barriers	Due to the procedures to obtain all the documents needed to accomplish the work, the entire implementation has been delayed by a year
SOURCE	WWW Romania and http://nwrm.eu
Documented by	Florentina Nanu - BDG; Ioana Groza - BDG; Albert Scrieu - GeoEcomar

NAS N9	Natural Park Comana, Romania
CLUSTER A. FLOW OF SERVICES	
1. Problem to be addressed	The main objective of the project was to conserve the biodiversity, the natural habitats, the wild species of flora and fauna and to assure an efficient management of protected natural areas, in particular, management of the ecological network Natura 2000 through reconstruction of Comana Wetland within Giurgiu County
2. VALUE PROPOSITION	
2A. Primary Value	Providing the habitat sustainability for birds
2B. Secondary Value	Improved touristic attraction
CLUSTER B: REGULATORY CONTEXT	
3. REGULATION	Ramsar Convention Bird Directive
CLUSTER C: MAPPING THE SUPPLY	
4: WHO IMPLEMENTS	The project was implemented by the current administrator RNP-Romsilva
5. KEY ACTIVITIES:	The lake Comana was restored to provide the needed habitat for birds according to Ramsar Convention and Bird Directive
6. KEY RESOURCES	Databases for monitoring environmental parameters characteristic for wetland habitats: precipitation, temperature and humidity in two areas of the pool and the monitoring of bird species, which constitute a source of information for those interested Storage all information received from the observatories within a Dispatcher and use the data in research activities
7. KEY PARTNERS	Ministry of Waters & Forests RNP Romsilva Local authorities from villages around County council Giurgiu EPA Giurgiu
8A. Primary service	Fulfil the objectives established through Bird Directive and the Ramsar Convention
8B. Secondary services	Natura 2000 Educational Environment & biodiversity
CLUSTER D: MAPPING THE COSTS OF THE SERVICE	
9. COST STRUCTURE	
9A. Lifecycle costs	Monitoring systems for the Natura 2000 sites and protected areas, including infrastructure and equipment for monitoring the natural habitats and the conservation status of flora and fauna species (monitoring system of environmental parameters and bird species)
9B. Opportunity costs	Penalties /Infringements
CLUSTER E: MAPPING THE DEMAND	
10: WHO OWNS THE PROBLEM	Ministry of Environment - responsible for Ramsar Convention and Bird Directive
11: CUSTOMER SEGMENTS	
11A. Direct beneficiaries	Migratory birds and permanent ones
11B. Clients	Tourists Birdwatchers Companies renting services

11C. Indirect beneficiaries	Schools Population Companies
CLUSTER F: MAPPING THE ABILITY/WILLINGNESS TO PAY	
12. REVENUE STREAMS	Fees for entrance and for various services Donations Participation in projects with national or EU funds
13: FUNDING: Please specify whether the funding for the income streams is coming from (or a mixture of):	
13A. Tariffs	Tariffs for various activities done within the park premises provide the daily budget needed and participation in various projects (national and EU funded)
13B. Taxes	No
13C. Transfers	The European Regional Development Fund, Sectorial Operational Programme Environment 2007-2013 was used for Comana Wetland restoration.
13D. Private funds or investment	No
FINANCING	Through the European Regional Development Fund mechanisms.
CLUSTER G. MAPPING THE SUPPLY-DEMAND INTERACTIONS	
14: CUSTOMER RELATIONSHIP	Transactional/long-term
15: CHANNELS	Internet/website Bird watching community Eco – promotion community
CLUSTER H: IMPACT	
16.IMPACT through KPIs	Monitoring system of bird species and environmental factors that will allow instantaneous observations and the opportunity to explore areas of avifauna interest without the presence of an operator
ADDITIONAL STEPS	
17. Success conditions	Funds available and communication. The Comana wetlands project also benefited from the strong awareness raising campaigns taking place since 2000, which have created the necessary local support for restoration (regional and local authorities, business and the local population). The Giurgiu County Council had a good collaboration with the Local Environmental Protection Agency and land users on the Comana wetland restoration area
18. Existing or potential barriers	Barriers for the implementation of the project were due to the process of public procurement for contracts regarding the supply / works / services, which consisted in appeals and had as a consequence procedures which led to delays in the project implementation. Addendum were necessary in order to extend the implementation period. This resulted from the inflexibility to redistribute savings and so required using beneficiaries own funds.
SOURCE	Desk research by BDG
Documented by	Florentina Nanu - BDG; Ioana Groza - BDG; Albert Scrieu - GeoEcomar

NAS N10	Natural Park Vacaresti, Romania
CLUSTER A. FLOW OF SERVICES	
1. Problem to be addressed	Protect the Park and the Biodiversity developed in an abandoned place
2. VALUE PROPOSITION	
2A. Primary Value	Protection of the habitat - fauna & flora created by nature in an abandoned place
2B. Secondary Value	Education of citizens and children about (the value of) nature
CLUSTER B: REGULATORY CONTEXT	
3. REGULATION	Legislation about hydraulic construction - the cement walls of the place cannot be removed or transformed
CLUSTER C: MAPPING THE SUPPLY	
4: WHO IMPLEMENTS	Administrator of the Park
5. KEY ACTIVITIES:	Obtain the status of Protected Area through a Government Decision
6. KEY RESOURCES	Funding, knowledge, government decision
7. KEY PARTNERS	Ministry of Environment ANAR Local Administration Sector 4 Central Administration Bucharest Experts and volunteers
8A. Primary service	Environment protection and habitat conservation
8B. Secondary services	Walking paths in the nature for people Educational activities for children and adults
CLUSTER D: MAPPING THE COSTS OF THE SERVICE	
9. COST STRUCTURE	
9A. Lifecycle costs	Maintenance works for park & observation locations Salaries Rent for the office
9B. Opportunity costs	Not reported
CLUSTER E: MAPPING THE DEMAND	
10: WHO OWNS THE PROBLEM	Ministry of Environment/National Agency for Protected Natural Areas
11: CUSTOMER SEGMENTS	
11A. Direct beneficiaries	Biodiversity Citizen
11B. Clients	Citizens Companies that run various events in the park
11C. Indirect beneficiaries	Citizens
CLUSTER F: MAPPING THE ABILITY/WILLINGNESS TO PAY	
12. REVENUE STREAMS	Donations Participation in various projects
13: FUNDING: Please specify whether the funding for the income streams is coming from (or a mixture of):	
13A. Tariffs	No
13B. Taxes	No

13C. Transfers	No
13D. Private funds or investment	Donations from partners
FINANCING	Not reported
CLUSTER G. MAPPING THE SUPPLY-DEMAND INTERACTIONS	
14: CUSTOMER RELATIONSHIP	Direct assistance
15: CHANNELS	Direct meetings with local and national stakeholders
CLUSTER H: IMPACT	
16.IMPACT through KPIs	Number of birds, mammals, amphibians, etc
ADDITIONAL STEPS	
17. Success conditions	Media exposure Political willingness Stubbornness of the applicants
18. Existing or potential barriers	Not reported
SOURCE	Meeting & interview October 10th, 2018 (ICAR event)
Documented by	Florentina Nanu - BDG; Ioana Groza - BDG; Albert Scrieu - GeoEcomar

NAS N11	Mahmudia-Carasuhat wetland restoration
CLUSTER A. FLOW OF SERVICES	
1. Problem to be addressed	Local community access to the water
2. VALUE PROPOSITION	
2A. Primary Value	Buffer for heavy precipitation: Capacity for retention approx. 80 m3 of flash flood wave
2B. Secondary Value	Economic development of the local communities, 'Environment & biodiversity
CLUSTER B: REGULATORY CONTEXT	
3. REGULATION	Not reported
CLUSTER C: MAPPING THE SUPPLY	
4: WHO IMPLEMENTS	The beneficiary was the local authorihy and the implementation was done by Danube Delta Biosphere Reservation in collaboration with WWF Romania
5. KEY ACTIVITIES:	The Carasuhat enclosure drianed in the past for agricultural activities was re-connected to the water (Sf. Gheorghe branch)
6. KEY RESOURCES	Existing drive from the local community and support of the local authority Accessible EU funds for implementation Support from WWF Romania and Danube Delta Biosphere Reservation
7. KEY PARTNERS	Local authority and county council Danube Delta Biosphere Reservation Ministry of Environment WWF Romania
8A. Primary service	Support local people and restoration of the former wetlands in the Danube floodplain
8B. Secondary services	Development of local tourism and of the local businesses based on natural resources provided by the wetland and the water
CLUSTER D: MAPPING THE COSTS OF THE SERVICE	
9. COST STRUCTURE	
9A. Lifecycle costs	Not known yet
9B. Opportunity costs	Local people had to make a detour of approx 40 km to reach the water
CLUSTER E: MAPPING THE DEMAND	
10: WHO OWNS THE PROBLEM	Local citizens
11: CUSTOMER SEGMENTS	
11A. Direct beneficiaries	Local citizens
11B. Clients	Local fisherman
11C. Indirect beneficiaries	Biodiversity recovery, Tourists
CLUSTER F: MAPPING THE ABILITY/WILLINGNESS TO PAY	
12. REVENUE STREAMS	Fees for fishing/renting / providing various services Projects with national or EU funds Tourism development Primary resources for local people
13: FUNDING: Please specify whether the funding for the income streams is coming from (or a mixture of):	
13A. Tariffs	No

13B. Taxes	No
13C. Transfers	EU funds for setup- approx. 2, 5 million Euro (Operational Programme Environment 2013-2017)
13D. Private funds or investment	No
FINANCING	No
CLUSTER G. MAPPING THE SUPPLY-DEMAND INTERACTIONS	
14: CUSTOMER RELATIONSHIP	Long-term
15: CHANNELS	Various meetings of the local, regional and national stakeholders
CLUSTER H: IMPACT	
16.IMPACT through KPIs	Restoration of the former wetland and natural habitat rehabilitation, Access of local people to the water and local development, capacity to receive 80 mil m3 water in case of floods Habitat rehabilitation – fauna & flora Increased number of tourists Local businesses development
ADDITIONAL STEPS	
17. Success conditions	Not reported
18. Existing or potential barriers	The private fields around could be flooded in case the new dike and the works done to protect them will break down
SOURCE	WWF Romania interview and desk research
Documented by	Florentina Nanu - BDG; Ioana Groza - BDG; Albert Scrieu - GeoEcomar

NAS N12	Washington DC Green Infrastructure Stormwater retention strategy
CLUSTER A. FLOW OF SERVICES	
1. Problem to be addressed:	The problem of storm water runoff impact is the pollution and the damage to river morphology by digging the stream and removing the sediments towards the Chesapeake bay through the Potomac river (sediments TDS is one of the three target pollutant of the Chesapeake bay with Nitrates and phosphorous) and causes flooding that negatively affects local residents and businesses. There is also an impact on biodiversity with the erosion harming habits.
2. VALUE PROPOSITION	
2A. Primary Value	Flood risk reduction. Damage costs value: not available.
2B. Secondary Value	Reduction of pollution, reduced sediment storage, reduced impacts on biodiversity. Quantified value: not available.
CLUSTER B: REGULATORY CONTEXT	
3. REGULATION	Developers & Properties that trigger the District's stormwater management regulations must install GI to retain runoff in large storm events. Stormwater management is largely driven by the clean water act of 1972 and with that the management of water quality. Green Infrastructure Program forms part of an agreement signed with the District of Columbia, the U.S. Environmental Protection Agency and the U.S. Department of Justice, modifying a 2005 federal consent decree to allow large-scale green infrastructure installations to form part of the long-term strategy for curtailing combined sewer overflows and improving water quality in the Rock Creek and Potomac watersheds.
CLUSTER C: MAPPING THE SUPPLY	
4: WHO IMPLEMENTS	Developers or Property owners who can be rewarded
5. KEY ACTIVITIES:	Adoption of green infrastructure implementation strategy and increase the construction of GI outside the area of the compensation should take place from a regulatory point of view. Strategy includes NBS: Bioretention (raingardens), Permeable Pavements, Green roofs (Rainwater harvesting cisterns) that can be installed in public spaces or private properties. Alternative grey measures would be sewer separation network to manage runoff.
6. KEY RESOURCES	Regulation, maintenance & control position: important teams in the institutions
7. KEY PARTNERS	Government, engineering companies, water supply utilities
8A. Primary service	Reduced stormwater management / damage
8B. Secondary services	Reduced sediment transport / pollution; Quality of life in area concerned "enhancing public spaces", aesthetical value, depending on the practice, GI can save money by reducing water consumption, heating and cooling costs, and property maintenance requirements
CLUSTER D: MAPPING THE COSTS OF THE SERVICE	
9. COST STRUCTURE	
9A. Lifecycle costs	Variable (not reported)
9B. Opportunity costs	Variable (not reported)
CLUSTER E: MAPPING THE DEMAND	
10: WHO OWNS THE PROBLEM	Stormwater management unit of the federal state of DC / city of Washington) within the Department of Energy & Environment of DC gov. Coordinates the SRC.
11: CUSTOMER SEGMENTS	

11A. Direct beneficiaries	The city/gov (less need in renewed in investment in storm water collection network)
11B. Clients	The users of the Chesapeake water (citizens connected to public water supply, Fishermen)
11C. Indirect beneficiaries	Citizens (all for public spaces GI / inhabitants of the area or of the property if private GI), The Environment
CLUSTER F: MAPPING THE ABILITY/WILLINGNESS TO PAY	
12. REVENUE STREAMS	Taxes + tariffs
13: FUNDING: Please specify whether the funding for the income streams is coming from (or a mixture of):	
13A. Tariffs	YES, GI implementors pay the cost of the construction (Voluntarily-installed GI can generate income from selling)
13B. Taxes	YES, Properties with GI may be eligible for River Smart Rewards discounts of up to 55% off DOEE's Stormwater Fee and up to 4% off DC Water's Clean Rivers Impervious Area Charge. Both fees are collected on the DC Water utility bill and based on the amount of impervious surface on a property.
13C. Transfers	No
13D. Private investment	No
FINANCING	stormwater retention credit (SRC) trading program: trading system on the retention. Developers can buy stormwater credits for 50% of the volume they should manage. SRCs are emitted by companies that construct GInfrastructure either on the open market or through the SRC Price Lock Program in the areas with less pressure on the prices of the land but more interest in retention. The GI will have more benefits than the same expense (NBS) in areas with efficient stormwater network and treatment because the stormwater is not treated, so for the same investment it's more efficient in this locatioin. Detention obligation cannot be traded.
CLUSTER G. MAPPING THE SUPPLY-DEMAND INTERACTIONS	
14: CUSTOMER RELATIONSHIP	Not reported
15: CHANNELS	Not reported
CLUSTER H: IMPACT	
16.IMPACT through KPIs	Avoided cost with grey (storm water tunnel) Reduced pollution loads Reduced treatment cost Ecological indicators Increasing local jobs
ADDITIONAL STEPS	
17. Success conditions	Regulation, maintenance & control position : important teams in the institutions
18. Existing or potential barriers	The market mechanism delocalize the compensation. Here it is more a benefit, because the gov prefers the GI are installed outside of central Washington were sewer system is not enough to treat pollution.
SOURCE	Interview by Nina Graveline to Brian Van Wye, Matthew Espie and Phetmano Phannavong (Department of Energy & Environment) – Government of DC - USA Date : 31 May 2018 https://doee.dc.gov/node/1283116
Documented by	Nina Graveline - INRA (previously BGRM)

NAS N13	Forest management practices to reduce wildfires in New Mexico
CLUSTER A. FLOW OF SERVICES	
1. Problem to be addressed:	Wildfires in New Mexico, which in 2011 burnt down over 63,000 has of forest within a week. Wildfires are expected to increase as a result of climate change.
2. VALUE PROPOSITION	
2A. Primary Value	Wildfire risk and impact reduction (Avoided damages: not reported)
2B. Secondary Value	Reduced water treatment costs associated to ash and powder dragged by runoff (Value; not reported)
CLUSTER B: REGULATORY CONTEXT	
3. REGULATION	US water and wildfire laws.
CLUSTER C: MAPPING THE SUPPLY	
4: WHO IMPLEMENTS	Alburquerque and Santa Fe cities, TNC
5. KEY ACTIVITIES:	Forest clearing, stream restoration, flood control and prevention, wild forest management. Each activity includes planning, restoration, education, communication and monitoring components.
6. KEY RESOURCES	Funds, human resources and skills (economists, technicians)
7. KEY PARTNERS	Albuquerque y Santa Fe cities, tribal communities, neighbouring communities, all water users, The Nature Conservancy
8A. Primary service	Wild fire risk and impact reduction
8B. Secondary services	Increased carbon capture, prevention of water pollution by ashes and dust,
CLUSTER D: MAPPING THE COSTS OF THE SERVICE	
9. COST STRUCTURE	
9A. Lifecycle costs	Not reported
9B. Opportunity costs	Not reported
CLUSTER E: MAPPING THE DEMAND	
10: WHO OWNS THE PROBLEM	Alburquerque and Santa Fe cities, US Federal Government, New Mexico inhabitants, local water supply companies,
11: CUSTOMER SEGMENTS	
11A. Direct beneficiaries	New Mexico inhabitants, local water supply companies
11B. Clients	New Mexico inhabitants through taxes
11C. Indirect beneficiaries	Tourists
CLUSTER F: MAPPING THE ABILITY/WILLINGNESS TO PAY	
12. REVENUE STREAMS	Interests from the fund
13: FUNDING	
13A. Tariffs	Not reported
13B. Taxes	Not reported
13C. Transfers	Rio Grande Water Fund, composed of US federal funds (US$4 million) and national funds (US$ 6.2 million)(main contribution). The first contribution amounting to US$ 2 million, was done by private foundations and was crucial for the establishment of the fund.

13D. Private funds	Not reported
FINANCING	Not reported
CLUSTER G. MAPPING THE SUPPLY-DEMAND INTERACTIONS	
14: CUSTOMER RELATIONSHIP	Transactional
15: CHANNELS	Meetings with partners, emails, formal communications
CLUSTER H: IMPACT	
16.IMPACT through KPIs	Surface of forest restored: 688,000 ha.
ADDITIONAL STEPS	
17. Success conditions	Not reported
18. Barriers	Not reported
SOURCE	The Nature Conservancy and MITECO (2019) Soluciones basadas en la naturaleza para la gestión del Agua en España. The Nature Conservancy (2017) Beyond the Source: The Environmental, Economic and Community Benefits of Source Water Protection.
Documented by	Beatriz Mayor - ICATALIST
NAS N14	**Coastal wetlands and flood damage reduction, US**
CLUSTER A. FLOW OF SERVICES	
1. Problem to be addressed	Increased impacts from hurricanes due to degradation of natural marshlands surrounding the area.
2. VALUE PROPOSITION	
2A. Primary Value	coastline protection. Avoided damage of M$625 during Hurricane Sandy
2B. Secondary Value	Reduce investment costs as compared to the replacement cost of artificial structure
CLUSTER B: REGULATORY CONTEXT	
3. REGULATION	Not reported
CLUSTER C: MAPPING THE SUPPLY	
4: WHO IMPLEMENTS	public and private
5. KEY ACTIVITIES:	Restoration of wetlands and mangroves
6. KEY RESOURCES	Funding, knowledge and capacities (ecologists, economists,…), commitment, good management,
7. KEY PARTNERS	Government and private investors, NGOs, insurance companies,
8A. Primary service	Hurricane impacts mitigation, reduced runoff and flood effects.
8B. Secondary services	Increased biodiversity, climate regulation, attraction of tourism.
CLUSTER D: MAPPING THE COSTS OF THE SERVICE	
9. COST STRUCTURE	
9A. Lifecycle costs	NA
9B. Opportunity costs	NA
CLUSTER E: MAPPING THE DEMAND	
10: WHO OWNS THE PROBLEM	Citizens and all stakeholders affected by the hurricane (local businesses, tourists,…)
11: CUSTOMER SEGMENTS	

11A. Direct beneficiaries	Institutions responsible to maintain and replace the artificial infrastructure.	
11B. Clients	Government and private investors	
11C. Indirect beneficiaries	Citizens, tourists, local businesses	
CLUSTER F: MAPPING THE ABILITY/WILLINGNESS TO PAY		
12. REVENUE STREAMS	premiums saving capitalized in a funding stream for a green bonds could fund a NBS	
13: FUNDING		
13A. Tariffs	Not reported	
13B. Taxes	Not reported	
13C. Transfers	Not reported	
13D. Private funds or investment	private investments for public benefits can come from green bonds; insurance and post disaster funding can provide direct investments in damage reducing actions and incentives to policyholders to take risk reducing actions	
FINANCING	should reflect the distribution of public or private benefits of flood protection / public financed sources (pre disaster options) ; European Investment Bank administers the Natural Capital Financial Facility to provide money to bankable projects //	
CLUSTER G. MAPPING THE SUPPLY-DEMAND INTERACTIONS		
14: CUSTOMER RELATION	Not reported	
15: CHANNELS	Not reported	
CLUSTER H: IMPACT		
16.IMPACT through KPIs	Length of road protected: 2,229 km	
ADDITIONAL STEPS		
17. Success conditions	Not reported	
18. Existing or potential barriers	identifying location where NBS can play a significant role in DRR; developing the experience and standards to overcome institutional biases that favour grey measures; developing institutional arrangements capable of matching available funding with the needs of indd situations	
SOURCE	Narayan, S., Beck, M.W.,Wilson, P.,Thomas, C., Guerrero, A., Shepard, C., Reguero, B.G., Franco, G., Ingram, C.J., Trespalacios, D. 2016. Coastal Wetlands and Flood Damage Reduction:Using Risk Industry-based Models to Assess Natural Defenses in the Northeastern USA. Lloyd's Tercentenary Research Foundation, London.	
Documented by	Roxane Marchal - CCR	

NAS N15	**Mexico Coral Reef Insurance around Cancun and Puerto Morelos**
CLUSTER A. FLOW OF SERVICES	
1. Problem to be addressed	Coral reef degradation by hurricanes damage hindering coastline protection
2. VALUE PROPOSITION	
2A. Primary Value	avoiding costs (such as $8 billion in 2005 after 2 hurricanes); insuring coral reef and hotels on the coastline

2B. Secondary Value	Reefs are the most important tourism attraction in Cozumel, Puerto Morelos, Punta Nizuc and Punta Cancun, attracting more than one million visitors per year who pay approximately USD 60 million to local tour operators. Without reefs there would be no beaches.
CLUSTER B: REGULATORY CONTEXT	
3. REGULATION	Not reported
CLUSTER C: MAPPING THE SUPPLY	
4: WHO IMPLEMENTS	TNC
5. KEY ACTIVITIES:	Restoration of coral reef after hurricane strike: remove debris from reefs to prevent further damage, such as sand, loose stones or broken corals; fix and consolidate loose colonies and broken fragments; collect broken pieces and set up nurseries for future transplanting.
6. KEY RESOURCES	Training for 40 brigade community members, equipment and organisation. Further training will add 20 new brigade members for the 2019 hurricane season in Cancún and Isla Mujeres.
7. KEY PARTNERS	TNC, insurer, citizens, cities, National Commission for Natural Protected Areas (CONANP) and the Research Center for Aquaculture and Fisheries (CRIAP)
8A. Primary service	Coral reefs reduce more than 90% of wave energy during storms protecting the coastline. If reefs are degraded, losses to infrastructure from a storm could triple. Reefs also reduce 60% of wave energy under normal conditions protecting beaches from erosion
8B. Secondary services	ensuring tourist activities
CLUSTER D: MAPPING THE COSTS OF THE SERVICE	
9. COST STRUCTURE	
9A. Lifecycle costs	The cost of immediate response ranges from USD 100,000 to USD 150,000, for an area 20 km long and requires 20 to 30 days of work, based on estimations from the Puerto Morelos National Park.
9B. Opportunity costs	The cost of not repairing the damages to coral would be much higher to the local economy, as tourism attracted by reefs will diminish and beach erosion will increase as coastal protection is reduced.
CLUSTER E: MAPPING THE DEMAND	
10: WHO OWNS THE PROBLEM	All citizens and stakeholders groups affected by hurricanes.
11: CUSTOMER SEGMENTS	
11A. Direct beneficiaries	Hotels and citizens, companies, hotel owners;
11B. Clients	Hotels and citizens along coastline
11C. Indirect beneficiaries	Tourists
CLUSTER F: MAPPING THE ABILITY/WILLINGNESS TO PAY	
12. REVENUE STREAMS	premiums from insurance contract
13: FUNDING	
13A. Tariffs	No
13B. Taxes	No
13C. Transfers	No
13D. Private funds	No

FINANCING	Parametric insurance which is defined by three elements: 1) a parameter (wind speed), 2) an polygon where the wind speed must occur, and 3) a payout. The payout varies according to the registered wind speed, as the higher the speed more damages: -Moderate damages: 100 knots to less than 130 = 40% of maximum payout -Severe damages: 130 knots to less than 160 = 80% of maximum payout -Catastrophic damages: 60 knots or more = 100% of maximum payout
CLUSTER G. MAPPING THE SUPPLY-DEMAND INTERACTIONS	
14: CUSTOMER RELATIONSHIP	parametric insurance
15: CHANNELS	Website
CLUSTER H: IMPACT	
16.IMPACT through KPIs	new insurance contract; restoration; new parametric insurance
ADDITIONAL STEPS	
17. Success conditions	Partnership by TNC and local actors to take action.
18. Barriers	Not reported
SOURCE	TNC (2019) Insuring Nature to Ensure a Resilient Future. The world's first insurance policy on a coral reef is now in place in Mexico.
Documented by	Roxane Marchal - CCR

NAS N16	Strategic land protection and revegetation for drought risk reduction in Quito
CLUSTER A. FLOW OF SERVICES	
1. Problem to be addressed	Andean high lands and marshes upstream Quito city host a great number of endangered species and are critical to ensure urban water supply of Quito City. These ecosystems have been greatly degraded, thus hindering water supply in the Metropolitan district during drought spells - which are expected to be more frequent as a result of climate change - as well as causing water use competition among sectors and water pollution problems.
2. VALUE PROPOSITION	
2A. Primary Value	Avoided losses from reduced operative and financial risks for water supply in Quito during drought seasons.
2B. Secondary Value	Reduced treatment costs due to water quality improvements (value: NA), improved fresh water ecosystem integrity (value: NA), river flow regulation (value: reduced damages from peak flows,NA), biodiversity and biomass protection (value: number of protected species, NA), revenues from alternative sustainable economic activities (Value: NA)
CLUSTER B: REGULATORY CONTEXT	
3. REGULATION	Municipal law from Quito municipality enforcing EPMAPS to devote 2% of their revenues to protect the river basins and adopt an integrated water management approach.
CLUSTER C: MAPPING THE SUPPLY	
4: WHO IMPLEMENTS	Quito water supply company (EPMAPS)
5. KEY ACTIVITIES:	Recovery of vegetal coverages, communication programs, environmental education and awareness, water management, control and surveillance programs, support to alternative sustainable economic activities.
6. KEY RESOURCES	Funds, specialized knowledge and skills (integrated water management specialists, biologists, forestal engineers, economists,…)
7. KEY PARTNERS	The Nature Conservancy (TNC) has supported and participated in the creation of the FONAG fund, together with Agencia Suiza para el Desarrollo y la Cooperación (COSUDE), la Empresa Eléctrica Quito S.A., Consorcio (CAMAREN), Cervecería Nacional, The Tesalia Springs Company
8A. Primary service	Reduce operative and financial risks for water supply in Quito during drought seasons.
8B. Secondary services	Reduce sedimentation and nutrients in water bodies, improve fresh water ecosystem integrity, river flow regulation, biodiversity and biomass protection, development of alternative sustainable economic activities
CLUSTER D: MAPPING THE COSTS OF THE SERVICE	
9. COST STRUCTURE	
9A. Lifecycle costs	Not reported
9B. Opportunity costs	Not reported
CLUSTER E: MAPPING THE DEMAND	
10: WHO OWNS THE PROBLEM	Quito water supply company (EPMAPS) and The Nature Conservancy (TNC)
11: CUSTOMER SEGMENTS	

11A. Direct beneficiaries	Quito citizens, Quito water supply company (EPMAPS)
11B. Clients	Quito citizens, Quito water supply company (EPMAPS)
11C. Indirect beneficiaries	Tourists, river basin water management authority, downstream communities
CLUSTER F: MAPPING THE ABILITY/WILLINGNESS TO PAY	
12. REVENUE STREAMS	Interests from the FONAG Fund
13: FUNDING: Please specify whether the funding for the income streams is coming from (or a mixture of):	
13A. Tariffs	No
13B. Taxes	No
13C. Transfers	Mix of transfer and public investment: FONAG fund is a private fund created by EPMAPS supported by a list institutions described in the 'Key partners' category. The fund has a life span of 80 years and to date it has accumulated US $16 millions, from which annual interests combined with other contributions sum US $2.5 millions that are invested every year in the different programs. A total of $20 millons have been invested in the Fund since it was created, and a study of the return of investment has shown a positive return of around US $2.15 per dollar invested.
13D. Private investment	Investment by contributors to the FONAG fund
FINANCING	annual interests combined with other contributions sum US $2.5 millions that are invested every year in the different programs.
CLUSTER G. MAPPING THE SUPPLY-DEMAND INTERACTIONS	
14: CUSTOMER RELATIONSHIP	Transactional through an economic transaction to carry out the works.
15: CHANNELS	Notifications, consultations
CLUSTER H: IMPACT	
16.IMPACT through KPIs	Not reported
ADDITIONAL STEPS	
17. Success conditions	Creation of the FONAG fund thanks to the collaboration of the partners.
18. Barriers	Not reported
SOURCE	The Nature Conservancy and MITECO (2019) Soluciones basadas en la naturaleza para la gestión del Agua en España.; The Nature Conservancy (2017) Beyond the Source: The Environmental, Economic and Community Benefits of Source Water Protection.
Documented by	Beatriz Mayor - ICATALIST

Examples of successful urban restoration interventions

NAS N17	Building urban resilience with nature: the case of Melbourn urban forest
CLUSTER A. FLOW OF SERVICES	
1. Problem to be addressed:	Urban floods and heatwaves
2. VALUE PROPOSITION	
2A. Primary Value	reduced urban flooding (Value avoided damaged costs: Not reported); heat impacts reduction (Value avoided damage costs: Not reported)
2B. Secondary Value	social welfare and biodiversity benefits, increased property value (thanks to trees value, increase of 2-9%: increase of 10% in the leaf canopy of street trees alone could increase the value of Sydney properties by an average of $50,000 per unit).
CLUSTER B: REGULATORY CONTEXT	
3. REGULATION	Melbourn's metropolitan urban forest strategy.
CLUSTER C: MAPPING THE SUPPLY	
4: WHO IMPLEMENTS	Melbourn's Municipality
5. KEY ACTIVITIES:	NBS measures: Urban forests, increase in canopy cover
6. KEY RESOURCES	political support,
7. KEY PARTNERS	green engineering, citizens, municipal authorities
8A. Primary service	greening cities
8B. Secondary services	natural disaster risk reduction
CLUSTER D: MAPPING THE COSTS OF THE SERVICE	
9. COST STRUCTURE	
9A. Lifecycle costs	For 13 local government areas, the structural street tree value was calculated to be A$2.5 billion, based on replacement cost of individual trees with a similar tree based on size, species, health and location.
9B. Opportunity costs	NA
CLUSTER E: MAPPING THE DEMAND	
10: WHO OWNS THE PROBLEM	Municipalities within Melbourn, Melbourn regional government.
11: CUSTOMER SEGMENTS	
11A. Direct beneficiaries	cities and citizens in metropolitan Melbourn area.
11B. Clients	Citizens through taxes.
11C. Indirect beneficiaries	tourists
CLUSTER F: MAPPING THE ABILITY/WILLINGNESS TO PAY	
12. REVENUE STREAMS	Not reported
13: FUNDING: Main funding coming from taxes	
13A. Tariffs	No
13B. Taxes	taxes paid by citizens
13C. Transfers	No

13D. Private investment	No
FINANCING	Not reported
CLUSTER G. MAPPING THE SUPPLY-DEMAND INTERACTIONS	
14: CUSTOMER RELATIONSHIP	Transaction
15: CHANNELS	workshops with citizens, local authorities
CLUSTER H: IMPACT	
16.IMPACT through KPIs	reduce risks, social welfare, mental welfare
ADDITIONAL STEPS	
17. Success conditions	Not reported
18. Barriers	Not reported
SOURCE	Earth Economics (2018) Building Urban resilience with nature. A practitioner's guide to action.
Documented by	Roxane Marchal - CCR and Beatriz Mayor, ICATALIST

NAS N18	**PROCTOR CREEK GREENWAY TRAIL IN ATLANTA**
CLUSTER A. FLOW OF SERVICES	
1. Problem to be addressed:	Wholly contained with the city's borders, Proctor Creek, a tributary of the Chattahoochee River, originates in downtown Atlanta and snakes through the economically depressed Westside neighbourhoods five miles from city centre, where more than 90% of residents are minorities. Within the 16 square miles of the Proctor Creek Watershed, over 50,000 people face poverty-related urban challenges like food deserts, health issues due to frequent flooding of sewage-contaminated water, and a high number of vacant and blighted properties. These particularly affect the stretch flowing through downtown Atlanta.
2. VALUE PROPOSITION	
2A. Primary Value	reduced urban flooding (Value avoided damaged costs: Not reported)
2B. Secondary Value	Reduced erosion, reduced pollution, reduced bacteria levels from storm water runoff and sewer overflows.
CLUSTER B: REGULATORY CONTEXT	
3. REGULATION	Atlanta's Resilience Strategy
CLUSTER C: MAPPING THE SUPPLY	
4: WHO IMPLEMENTS	Atlanta Municipality, Atlanta Department of Watershed Management
5. KEY ACTIVITIES:	construct the first segment of the new Proctor Creek Greenway Trail, complete with biking and pedestrian trails
6. KEY RESOURCES	Funds, endorsement by voters, urban land use regulation
7. KEY PARTNERS	EPA, Atlanta Municipality, voters
8A. Primary service	Flood risk reduction through curbing flooding and runoff
8B. Secondary services	Facilitate exercise and healthy living, enhance Atlanta's natural assets, and foster economic development, increased connectivity to other areas of Atlanta, and foster a sense of an overall more cohesive community
CLUSTER D: MAPPING THE COSTS OF THE SERVICE	

9. COST STRUCTURE	
9A. Lifecycle costs	Not reported
9B. Opportunity costs	Alternative investments, use of tax money for other purposes.
10: WHO OWNS THE PROBLEM	Citizens of Atlanta, especially from depressed areas
11: CUSTOMER SEGMENTS	
11A. Direct beneficiaries	Citizens of Atlanta, local businesses,
11B. Clients	Citizens of Atlanta, local businesses,
11C. Indirect beneficiaries	Tourists,
CLUSTER F: MAPPING THE ABILITY/WILLINGNESS TO PAY	
12. REVENUE STREAMS	Not reported
13: FUNDING: Mainly a tax based funding formula.	
13A. Tariffs	No
13B. Taxes	$3.6 million investment from a transportation-oriented special-purpose sales tax (TSPLOST) endorsed by voters in 2016.
13C. Transfers	$160,000 investment from the Atlanta Department of Watershed Management
13D. Private funds	No
FINANCING	Not reported
CLUSTER G. MAPPING THE SUPPLY-DEMAND INTERACTIONS	
14: CUSTOMER RELATIONSHIP	Transaction
15: CHANNELS	Website, tax forms, consultations,
CLUSTER H: IMPACT	
16.IMPACT through KPIs	400 acres of green space and 50 acres of linear park, and it will connect scores of isolated neighbourhoods in West and Northwest Atlanta to schools, restaurants, and transit. Moreover, when Cobb County and Fulton County build their respective river walks that traverse the Chattahoochee, the Proctor Creek Greenway will eventually link downtown Atlanta to the Silver Comet Trail that runs all the way out to Alabama
ADDITIONAL STEPS	
17. Success conditions	Not reported
18. Barriers	Not reported
SOURCE	Earth Economics (2018) Building Urban resilience with nature. A practitioner's guide to action.
Documented by	Beatriz Mayor, ICATALIST

NAS N19	NBS for managing stormwater and waste in Malmö, Sweden
CLUSTER A. FLOW OF SERVICES	
1. Problem to be addressed:	The Augustenborg neighbourhood in Malmö has historically been vulnerable to floods. Stormwater was handled by a combined sewer system that handled both sewage and runoff, which overloaded in periods of heavy rainfall, causing basement flooding and sewage to enter watercourses.
2. VALUE PROPOSITION	
2A. Primary Value	reduced urban flooding by 70% and eliminate combined sewer overflow
2B. Secondary Value	Cooling effect in summer: 50% impact; Biodiversity increase: 50% increase detected; carbon emissions reduction: 20% reduction measured; stimulation of local economy (26% reduction in unemployment).
CLUSTER B: REGULATORY CONTEXT	
3. REGULATION	GSF/Green Points; National environmental goals. The Planning and Building Act posed some barriers that had to be overcome.
CLUSTER C: MAPPING THE SUPPLY	
4: WHO IMPLEMENTS	Malmö Municipality
5. KEY ACTIVITIES:	The new open drainage system was constructed to handle as much rainwater as possible near the source via local infiltration on green roofs, lawns, and permeable parking lots. The system was divided into four parts: 1) 9,500 square meter Augustenborg Botanical Roof Garden; 2) central drainage corridor; 3) Lönngatan drainage corridor; 4) Other features such as additional green roofs, permeable parking lots, local detention ponds, and floodable area.
6. KEY RESOURCES	Communication/knowledge transfer; pilot projects as examples of what can be done; cooperation with researchers; public/private partnerships
7. KEY PARTNERS	Malmö Municipality
8A. Primary service	Flood risk reduction and sewage overflow avoidance
8B. Secondary services	Cooling effect, biodiversity enhancement, carbon emissions reductions, social and community inclusiveness, stimulation of local economy.
CLUSTER D: MAPPING THE COSTS OF THE SERVICE	
9. COST STRUCTURE	
9A. Lifecycle costs	Not reported
9B. Opportunity costs	Alternative investments, use of tax money for other purposes.
10: WHO OWNS THE PROBLEM	Citizens of Malmö, Malmö Municipality as responsible for addressing the risk.
11: CUSTOMER SEGMENTS	
11A. Direct beneficiaries	Neighbours of Augustenborg, local businesses
11B. Clients	Municipality of Malmö

11C. Indirect beneficiaries	Tourists, citizens of other border neighbourhoods of Malmö
CLUSTER F: MAPPING THE ABILITY/WILLINGNESS TO PAY	
12. REVENUE STREAMS	taxes from new businesses and economic activities
13: FUNDING: co-funding through private-public partnerships	
13A. Tariffs	Not reported
13B. Taxes	Indirect through taxes from new businesses and economic activities
13C. Transfers	Funds from the national government
13D. Private funds	Not reported
FINANCING	Not reported
CLUSTER G. MAPPING THE SUPPLY-DEMAND INTERACTIONS	
14: CUSTOMER RELATIONSHIP	Not reported
15: CHANNELS	Participatory activities with citizens, consultations during the elections
CLUSTER H: IMPACT	
16.IMPACT through KPIs	Regeneration of a marginal area: 1,600 out of 1,800 homes available as rentals and 62% of residents reporting a foreign background in 2007; Cooling effect in summer: 50% impact; Biodiversity increase: 50% increase detected; carbon emissions reduction: 20% reduction measured; stimulation of local economy (26% reduction in unemployment).
ADDITIONAL STEPS	
17. Success conditions	Public/private partnerships; availability of funding earmarked for environmental projects; Incorporation of related concepts into municipal planning policy; engaged people.
18. Barriers	Inertia/path-dependency at municipality level; Silo thinking/lack of cooperation between departments; Lack of prioritization; Over-reliance on points-based systems, e.g. GSF; Uncertainty about cost/benefit; Lack of knowledge; Lack of planning tools
SOURCE	Barton, M.A. (2016) Nature-Based Solutions in Urban Contexts. A Case Study of Malmö, Sweden. Thesis for the fulfilment of the Master of Science in Environmental Sciences, Policy & Management (MESPOM) jointly operated by Lund University –University of Manchester - University of the Aegean –Central European University.
Documented by	Beatriz Mayor, ICATALIST

Examples of economic instruments for funding ecosystem restoration interventions

ECONOMIC INSTRUMENT EI 1	Water funds in Latin America (16 operating funds supported by the Latin American Water Funds Partnership (LAWFP))
CLUSTER A. FLOW OF SERVICES	
1. Problem to be addressed:	The water funds mainly address issues related to water quantity (14/16) and quantity (15/16) but many funds pursue social and biodiversity objectives. For water quantity the main concern is to maintain dry season flow. For water quality the aim is mainly to reduce sediment and to a lesser extent nutrient runoff. Only a Water fund established in Mexico specifically pursues objectives related to flood mitigation.
2. VALUE PROPOSITION	
2A. Primary Value	Improvement of water quality and water quantity
2B. Secondary Value	Flood mitigation, biodiversity conservation, socio-economics objectives (poverty reduction, economic development)
CLUSTER B: REGULATORY CONTEXT	
3. REGULATION	Legal means to secure funding included municipal ordinances requiring reinvestment of a portion of water utility profits in watershed management; national laws channeling environmental offsets to water funds; and laws requiring that water user fees (collected from water utilities and large companies) be invested in conservation
CLUSTER C: MAPPING THE SUPPLY	
4: WHO IMPLEMENTS	The natural measure is generally implemented by upstream land-owners.
5. KEY ACTIVITIES:	Protection of terrestrial ecosystems (Brazilian Atlantic forest or Andean Grassland) and revegetation activities upstream.
6. KEY RESOURCES	Water funds link downstream beneficiaries to upstream land stewards through a sustainable institutional mechanism. Water funds share three primary organizational components: a funding mechanism to collect and provide resources for watershed conservation, a governance mechanism for joint planning and decision-making, and a watershed management mechanism to carry out funded conservation and management activities.
7. KEY PARTNERS	Municipalities, Water Fund Board, Watershed Comittees, Water utilities, NGOs, International donors
8A. Primary service	Improvement of water quality and water quantity.
8B. Secondary services	Flood mitigation, biodiversity conservation, socio-economics objectives (poverty reduction, economic development).
CLUSTER D: MAPPING THE COSTS OF THE SERVICE	
9. COST STRUCTURE	
9A. Lifecycle costs	Not reported
9B. Opportunity costs	The main cost are related to the change of land use/agricultural practices or to the foregone profit of not turning natural ecosystems into agricultural land.
CLUSTER E: MAPPING THE DEMAND	
10: WHO OWNS THE PROBLEM	The problem addressed in these case studies mainly affects water utilities and municipalities in charge of water management
11: CUSTOMER SEGMENTS	

11A. Direct beneficiaries	The direct beneficiaries are water users who benefit from a secured access to water and an improved quality
11B. Clients	The clients are mainly municipalities and water utilities who manage water. Specific governance bodies are implemented to manage the water fund. They both collect funds and fund the implementation of NBS.
11C. Indirect beneficiaries	Tourists who visit these countries who benefit from improved water services.
CLUSTER F: MAPPING THE ABILITY/WILLINGNESS TO PAY	
12. REVENUE STREAMS	The logic of the revenue stream is to collect funds from beneficiaries downstream of improved water quality and quantity to land owner upstrams that implement the measures. Other public funds, and international development funds may however also fund these activities which ultimately comes from national or international tax payers. This funding is justified by the public good produced such as ecosystem preservation and related co-benefits.
13: FUNDING: Please specify whether the funding for the income streams is coming from (or a mixture of):	
13A. Tariffs	No
13B. Taxes	Taxes taken on water users through water utilities are used at least for the establishment of the water fund. In some cases, taxes are only taken on largest water users.
13C. Transfers	International development funds and NGOs.
13D. Private investment	Possible donations by fund contributors
FINANCING	Annualized investment payments through the fund.
CLUSTER G. MAPPING THE SUPPLY-DEMAND INTERACTIONS	
14: CUSTOMER RELATIONSHIP	For cash transfers, Payment for Environmental Services with legal contracts are implemented in Brazil but with less stringent contracts in other countries. In-kind support is also provided by water fund staff.
15: CHANNELS	Trainings, internet
CLUSTER H: IMPACT	
16.IMPACT through KPIs	Streamflow measurement abd sediment levels, water quantity and quality at downstream points, socio-economic impact on rural landowners.
ADDITIONAL STEPS	
17. Success conditions	Willingness to cooperate by partners involved in the fund
18. Barriers	Not reported
SOURCE	Bremer, L.L., Auerbach, D.A., Goldstein, J.H., Vogl, A.L., Shemie, D., Kroeger, T., Nelson, J.L., Benítez, S.P., Calvache, A., Guimarães, J., Herron, C., Higgins, J., Klemz, C., León, J., Sebastián Lozano, J., Moreno, P.H., Nuñez, F., Veiga, F., Tiepolo, G., 2016. One size does not fit all: Natural infrastructure investments within the Latin American Water Funds Partnership. Ecosyst. Serv. 17, 217–236.
Documented by	Philippe Le Coen - BGRM

ECONOMIC INSTRUMENT EI2	Financing nature-based solutions with climate bonds
CLUSTER A. FLOW OF SERVICES	
1. Problem to be addressed:	Lack of finance and standardization for natural infrastructure
2. VALUE PROPOSITION: Providing certification to demonstrate that natural infrastructure provide quantifiable mitigation, adaptation, and resilience benefits	
2A. Primary Value	Bonds help to raise large sums of money (tens of millions USD up to several billion USD per project) to build or upgrade resilient water infrastructure for purposes of water storage, water treatment, flood defense, ecological restoration, etc.
2B. Secondary Value	Selection of nature-based over traditional "gray" infrastructure can lead to co-benefits of avoided costs, social benefits such as green and recreational spaces, or climate co-benefits
CLUSTER B: REGULATORY CONTEXT	
3. REGULATION	Bond accreditation/rating, National or state regulations for infrastructure safety measures, demonstration of benefits
CLUSTER C: MAPPING THE SUPPLY	
4: WHO IMPLEMENTS	Bond issuer (public/private utility, various levels of government, corporations)
5. KEY ACTIVITIES:	Issuing of certified climate bonds graded against a scientifically robust and transparent scorecard system
6. KEY RESOURCES	A vulnerability assessment for the proposed infrastructure, completion of the Water Infrastructure Criteria Scorecard, secondary verification from a third party, and final approval from the board at Climate Bonds Initiative
7. KEY PARTNERS	Bond issuer will be in charge of either implementing or hiring out the construction and/or upgrade process for infrastructure. Climate Bonds Initiative ultimately provides approval of certification. A third party is used to verify the scorecard criteria.
8A. Primary service	Raising funds for nature-based or hybrid water infrastructure
8B. Secondary services	Certification scheme serves as a marketing tool to promote "green" projects and sustainable finance
CLUSTER D: MAPPING THE COSTS OF THE SERVICE	
9. COST STRUCTURE	
9A. Lifecycle costs	Hiring of an approved third party to verify bonds criteria are met. Climate Bonds Initiative's fee for certification (1/10th of a basis point of the size of the bond) Internal staffing time to setup the proper protocols and systems in order to meet the requirements of the Climate Bonds Standard. Payment of interest for bonds, determined at original time of issuance.
9B. Opportunity costs	Not reported
CLUSTER E: MAPPING THE DEMAND	
10: WHO OWNS THE PROBLEM	Bond issuer (public/private utility, various levels of government, corporations)
11: CUSTOMER SEGMENTS	
11A. Direct beneficiaries	Bond issuers receiving funds for their projects. Local population receiving services of infrastructure (e.g., clean drinking water, flood defense).

11B. Clients	Investors that purchase the climate bonds. Often large scale asset managers, treasuries, pension funds, or corporations.
11C. Indirect beneficiaries	Broader regional, national, or global population as the projects being financed must have mitigation, adaptation, and resilience benefits to address climate change. Ecosystems are also indirect beneficiaries as they are either being restored, improved upon, or at least not harmed through implementation of natural infrastructure over traditional "built" infrastructure
CLUSTER F: MAPPING THE ABILITY/WILLINGNESS TO PAY	
12. REVENUE STREAMS	"Initial stream of funds comes from money raised as investors purchase bonds. Subsequent revenue from payment for services or taxes from infrastructure use. Or, in cases of infrastructure for disaster prevention (e.g., dikes), money can come from avoided damages."
13: FUNDING: Please specify whether the funding for the income streams is coming from (or a mixture of):	
13A. Tariffs	no
13B. Taxes	no
13C. Transfers	no
13D. Private funds or investment	Yes
FINANCING	Certified climate bonds.
CLUSTER G. MAPPING THE SUPPLY-DEMAND INTERACTIONS	
14: CUSTOMER RELATIONSHIP	Transactional
15: CHANNELS	Clients purchase bonds through financial markets. Bond issuers submit their proposed issuances to CBI through emails with a formal third party verification report. CBI issues a formal certificate of certification to issuers upon approval. Issuers also communicate with broader groups to promote issuance and raise interest through press releases and other forms of engagement to reach investors.
CLUSTER H: IMPACT	
16.IMPACT through KPIs	To date, hundreds of millions of U.S. dollars have been raised to fund water infrastructure of traditional, green, and hybrid types. Generally tracked by financial scale (USD)
ADDITIONAL STEPS	
17. Success conditions	Interest from investors in purchasing certified climate bonds, which to date has been very strong and is expected to grow further.
18. Existing or potential barriers	Use of other types of finance, including other categories of bond certification. Depends on the type of project being financed.
SOURCE	More information on the Water Infrastructure Criteria at https://www.climatebonds.net/standard/water
Documented by	Alexander Mauroneur - Alliance for Water/SIWI

ECONOMIC INSTRUMENT EI3	Eco-Engineering Decision Scaling (EEDS)
CLUSTER A. FLOW OF SERVICES	
1. Problem to be addressed:	Evaluating trad-eoffs between ecological and engineering solutions for climate resilience
2. VALUE PROPOSITION: EEDS establishes the water-climate criteria that can meet stakeholder or expert standards for success and failure and uses a stress-test approach to develop and compare green, hybrid and grey solutions for their impacts on ecosystems and water management needs. The EEDS framework significantly contrasts with approaches typically used to assess the environmental impacts of water infrastructure projects by evaluating trade-offs in the initial stages of planning and development rather than as a post-hoc "impact" assessment. Such early evaluation of ecosystem vulnerability is needed to reveal a range of potential design and management options in complex social-ecological systems	
2A. Primary Value	Providing an analytical framework to directly compare green, grey, and hybrid solutions. Opening potential pool of solutions to wider possibilities, more flexible, or robust options.
2B. Secondary Value	Providing evidence to justify (in some cases) environmental solutions to climate challenges. Avoided damages to environment. Co-benefits to other stakeholders possible in some cases of environmental solutions (spiritual, recreational, cultural benefits).
CLUSTER B: REGULATORY CONTEXT	
3. REGULATION	Legal frameworks governing infrastructure, freshwater ecosystems, water supply, etc.
CLUSTER C: MAPPING THE SUPPLY	
4: WHO IMPLEMENTS	Varies. Generally an entity whose responsibility is water resources management (e.g., national to local governments, environmental agencies, other commissions, etc.)
5. KEY ACTIVITIES:	EEDS is a stepwise analytical framework for risk assessment, evaluation of management and infrastructure options, and feasibility assessment for comparing green, grey, and hybrid infrastructure solutions, especially around areas of climate uncertainty. The EEDS process has five key steps. The first two steps involve defining a set of ecological performance indicators in the same terms as the relevant engineering indicators, with steps 3 and 4 (and 5, if necessary) comparing and evaluating approaches to balance and trade-off risks and opportunities between ecological and engineering concerns.
6. KEY RESOURCES	Stakeholder engagement with numerous communities involved. Systems model (e.g., WEAP or VIC) to evaluate consequences of management decisions across wide range of stressors. Stochastic weather generator for hydro-climatic simulations. Historical data for chosen performance indicators. Stakeholder-defined thresholds of success and failure for services of interest (e.g., water supply, flood defence, species population, etc.).
7. KEY PARTNERS	Dependent upon the problem being addressed. Stakeholder involvement is critical, so local stakeholder groups are always to be involved. Water resource management agencies Hydrologists, engineers, ecologists, other technical experts.
8A. Primary service	Quantifiable comparison of nature-based solutions versus traditional built infrastructure for various water management challenges. Incorporates freshwater ecosystems in water management decision making and climate risk assessment.
8B. Secondary services	Provides more options for water management challenges, including potentially cheaper, more robust, less invasive options. More information with which to make decisions that have long-term ramifications.

CLUSTER D: MAPPING THE COSTS OF THE SERVICE	
9. COST STRUCTURE	
9A. Lifecycle costs	Important to distinguish between application of EEDS and the actual building of infrastructure, which is different. EEDS is a framework for assessing options. The decision to move forward and build/implement is separate.
9B. Opportunity costs	Important to distinguish between application of EEDS and the actual building of infrastructure, which is different. EEDS is a framework for assessing options. The decision to move forward and build/implement is separate.
CLUSTER E: MAPPING THE DEMAND	
10: WHO OWNS THE PROBLEM	Water management decision makers (varies)
11: CUSTOMER SEGMENTS	
11A. Direct beneficiaries	Ecosystems since nature-based solutions are often left out of discussions regarding infrastructure solutions for water management challenges
11B. Clients	Water management decision makers (varies)
11C. Indirect beneficiaries	Varies depending on application of EEDS. Often the local ecosystems benefit. In general, local communities and water users benefit since EEDS is used to assess water management solutions.
CLUSTER F: MAPPING THE ABILITY/WILLINGNESS TO PAY	
12. REVENUE STREAMS	Important to distinguish between application of EEDS and the actual building of infrastructure, which is different. EEDS is a framework for assessing options. The decision to move forward and build/implement is separate.
13: FUNDING: Please specify whether the funding for the income streams is coming from (or a mixture of):	
13A. Tariffs	no
13B. Taxes	no
13C. Transfers	Varies. Conducting EEDS process is generally paid for by the water management agency in charge of decision making for infrastructure, planning, and operations. Sometimes this funding comes from a level of government involved or a development bank. Depends on the scope and context of project under analysis.
13D. Private funds or investment	Conducting EEDS process is generally paid for by the water management agency in charge of decision making for infrastructure, planning, and operations.
FINANCING	no
CLUSTER G. MAPPING THE SUPPLY-DEMAND INTERACTIONS	
14: CUSTOMER RELATIONSHIP	Transactional
15: CHANNELS	Clients purchase bonds through financial markets. Bond issuers submit their proposed issuances to CBI through emails with a formal third party verification report. CBI issues a formal certificate of certification to issuers upon approval. Issuers also communicate with broader groups to promote issuance and raise interest through press releases and other forms of engagement to reach investors.
CLUSTER H: IMPACT	
16.IMPACT through KPIs	Varies depending on application of EEDS. Each application analyses an area (or areas) of system performance deemed most important to stakeholders and water managers. Examples of KPIs include: provision of environmental flows, flood risk reduction, drought risk alleviation, species population / conservation, groundwater recharge, etc.
ADDITIONAL STEPS	

17. Success conditions	The EEDS process is a success if resource managers and decision makers are presented with numerous options as well as the conditions of their success. Bringing nature-based systems onto the same level of justifiable options as traditional infrastructure is itself a success.
18. Existing or potential barriers	Lack of historical data to be used in the systems models has presented challenges in the past. With numerous stakeholder groups involved, multiple performance indicators also need to be analyzed, but it is ultimately up to the decision makers to determine how to use the results of the EEDS analysis.
SOURCE	Desk research
Documented by	Alexander Mauroneur - Alliance for Water/SIWI

ECONOMIC INSTRUMENT EI4	Watershed Payments for Ecosystem Services (PES)
CLUSTER A. FLOW OF SERVICES	
1. Problem to be addressed	water quality and flood control
2. VALUE PROPOSITION	
2A. Primary Value	Flood reduction, water quality, biodiversity conservation.
2B. Secondary Value	Carbon sequestration, socioeconomic benefits,
CLUSTER B: REGULATORY CONTEXT	
3. REGULATION	Not reported
CLUSTER C: MAPPING THE SUPPLY	
4: WHO IMPLEMENTS	farmers
5. KEY ACTIVITIES:	green management such as land conversion programs, payments to farmers to stop cultivating on steep slopes; wetlands and stream mitigation (comparable wetlands and streams created offsite to compensate for filling wetlands); biodiversity compliance (biodiversity credits similar to carbon credits); measurable conservation activities (e.g. 34,000 ha of rain forest conservation initiative in Malasya); coluntary forest and land-use carbon market (voluntary purchase of offset credits); compliance forest carbon market (cap and trade market); REDD readiness finance (activities that avoid deforestation and maintain carbon stocks).
6. KEY RESOURCES	Funding, knowledge, contractual agreement, willingness, legislation.
7. KEY PARTNERS	governments, farmers, ecosystem services users
8A. Primary service	Flood reduction, water quality, biodiversity conservation.
8B. Secondary services	Carbon sequestration, socioeconomic benefits,
CLUSTER D: MAPPING THE COSTS OF THE SERVICE	
9. COST STRUCTURE	
9A. Lifecycle costs	Not reported
9B. Opportunity costs	Not reported
CLUSTER E: MAPPING THE DEMAND	
10: WHO OWNS THE PROBLEM	Downstream water users/citizens in downstream areas/governments and water managers who are responsible to address the problems.
11: CUSTOMER SEGMENTS	
11A. Direct beneficiaries	citizens; 53 million farmers who received compensation
11B. Clients	the government / the users
11C. Indirect beneficiaries	citizens
CLUSTER F: MAPPING THE ABILITY/WILLINGNESS TO PAY	
12. REVENUE STREAMS	public/user private finance rewards land managers for enhancing or protecting ecosystem services
13: FUNDING: Users of ecosystem services agree to compensate landholders for activities that maintain or enhance the delivery of ecosystem services. Users may be individuals, companies, non-governmental organizations (NGOs) or public. User-financed PES. Users of ecosystem services agree to compensate landholders for activities that maintain or enhance the delivery of ecosystem services. Users may be individuals, companies, non-governmental organizations (NGOs) or public actors that are direct beneficiaries of ecosystem services	

protection, enhancement or re-establishment. This includes payments by hydroelectric companies to landholders in the upper watershed for maintenance of forests and their ecosystem service of erosion control. -Government-financed PES. Third parties acting on behalf of users compensate landholders for activities that maintain or enhance ecosystem services delivery. The buyer is a public or private entity (such as a conservation group) that does not directly use the ecosystem service. This includes government programmes in Costa Rica and China that pay landholders for reduced deforestation or afforestation activities that enhance flood protection, water quality or other ecosystem services. -Compliance PES. 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.	
13A. Tariffs	When funds come from water-related service use through a specific tariff.
13B. Taxes	Variable
13C. Transfers	When governments provide the funds to compensate farmers/service providers.
13D. Private investment	Variable
FINANCING	Through the PES system
CLUSTER G. MAPPING THE SUPPLY-DEMAND INTERACTIONS	
14: CUSTOMER RELATIONSHIP	government-financed; transactional
15: CHANNELS	Not reported
CLUSTER H: IMPACT	
16.IMPACT through KPIs	Not reported
ADDITIONAL STEPS	
17. Success conditions	Not reported
18. Barriers	Not reported
SOURCE	Salzman, J., Bennett, G., Carroll, N., Goldstein, A. & Jenkins, N. (2018) The global status and trends of Payments for Ecosystem Services. NATURE SUSTAINABILITY | VOL 1 | MARCH 2018 | 136–144
Documented by	Roxane Marchal - CCR

6.2 Annex 2. Examples of successful financing facilities

Code	Name	Managing institution	Type or finance climate_infra_DDR	Funding source	AIM	THEMATIC AREAS	MAGNITUDE capital managed by the Facility	BENEFICIARIES	HAS SUPPORT ECOSYSTEM RESTORATION? Yes,/No— WHICH? (Watershed, Biodiversity, Forest, Other)	FINANCIAL INSTRUMENTS The mechanism for providing capital	DETAILED INFO
FF1 [A]	Public or Private			PUBLIC							
	Conditional?			NO							
	The global climate change alliance plus (GCCA+)	Indirect Management by	Climate Finance	European Union	Helping the world's most vulnerable countries to address climate change.	Mainstreaming climate change Increasing resilience to climate-related stresses and shocks supporting formulation and implementation	EUR 317.5 million in the first phase (2007-2014) EUR 420 million in the second phase (2014-2020)	National, regional and worldwide scope in Africa, Asia, the Caribbean, and the Pacific	YES [1] ICZM, mangrove restoration, protection, and restoration of watersheds	**Traditional:** sector programs, joint programming, joint implementation, and co-financing / pooled funds **Optional:** blending grants with loans (blending) if feasible	Click here
FF1 [B]	Public or Private			PUBLIC							
	Conditional?			NO							
	European Fund for Regional Development (ERDF)	EU countries (partnership	Climate Finance	European Union	Strengthening economic and social cohesion in the European Union by correcting imbalances between its regions.	Research and innovation Use of information & communication technologies Small and medium-sized enterprises Climate change mitigation	Global budget: 183,3 billion euro 2014-2020	European Union	YES	**Loans Microcredit Equity Guarantees**	Click here
FF2	Public or Private			PUBLIC							
	Conditional?			NO							
	Infra. Dev. Collab. Partnership Fund (DevCo)	Internati onal	Infrastru cture	Min. of Foreign Affairs - NL	Structuring transactions that facilitate private sector participation	Agribusiness Power and ren. energy Water and sanitation Telecommunicati.	Total commitment $15.6 million in donor funds committed to deals that reached	Poorer [DAC I and III] countries	NO	**Technical assistance**	Click here

					in infrastructure projects.	Transportation Solid waste Other physical infrastructure services	financial close, $14.1 million in donor funds committed to active deals.				
FF3	***Public or Private***						PUBLIC				
	Conditional?						NO				
	Development Cooperation Instrument (DCI)	European Union	Partially climate finance	European Union	Alleviate poverty, contributes to other international priorities of the EU	Geographical programs Global Public Goods and Challenges (GPGC Civil Society Organisations and Local Authorities (CSO-LA) Pan-African	EUR 19 661.64 million in commitments (about 1.81 % of the 2014-2020 MFF)	Latin America North and South-East Asia Middle East other countries	NO	**Regional Financing Facilities**	Click here
FF4	***Public or Private***						PUBLIC				
	Conditional?						NO				
	Green Africa Power [GAP] - fund	(EISER), in collaboration with Camco Clean Energy	Climate Finance	UK aid and Norway MFA	Promote the development of renewable power generation in sub-Saharan Africa	Wind Solar Hydro Geothermal Sustainable biomass and biogas Waste energy Grid infrastructure	EUR £121 mln in capital commitments from DFID, DECC and the Government of Norway	Sub-Saharan Africa	NO	**Subordinated loan/ Quasi-Equity loan** **Contingent line of credit** GAP can provide up to 20% of the capital value of a project.	Click here
FF5	***Public or Private***						PRIVATE				
	Conditional?						NO				
	GuarantCo	PIDG and FMO	Infrastructure	PIDG and FMO	Support local currency finance for infrastructure in low-income countries, promote domestic	Power / Energy supply Gas Manufacturing related to infrastructure Transportation	$309.6m [Capacity of over $1bn]	LDCs OLICs LMICs	NO	**Guarantee** **TA from PIDG technical assistance facility**	Click here

					infra financing and capital market development In Conflict-Affected States	Oil Special Economic Zones Digital communication infrastructure Social infrastructure Multisector					

FF6	*Public or Private*			PRIVATE							
	Conditional?			NO							
	ICF-DP [Infrastructure Crisis Facility – Debt Pool]	PIDG, Cordiant Capital Inc. and a Board of three non-executive Directors	Infrastructure	PIDG and KFW	Direct loan financing to qualified infra projects for Institutions that cannot obtain commercial financing	Power generation, transmission, distribution Transportation Bulk storage and logistics Water supply, sanitation, solid waste Midstream and downstream gas Oil internet infra components of industrial or mining projects cement plants Low-income housing	500 million $	ODA Countries with a target of 30% of projects in IDA countries	NO	Commercial pricing expected Funding ratio/amounts: Maximum tenor until 30 December 2028 No less than $10M, no more than €50M	Click here or Click here
FF7	***Public or Private***			PUBLIC							
	Conditional?			NO							
	Green Investment Bank	UKCI -Joint venture, between GIB, and UK	Conservation Finance	Government of the UK	Investments in green infrastructure projects that provide for both financial and green investment returns by leveraging of a private sector capital.	Energy efficiency Waste and bioenergy Offshore wind Onshore renewables	EUR £200m of funds	UK	YES (led over £15 billion of investment into green infrastructure)	Equity and debt bank	Click here
FF8	***Public or Private***			PUBLIC							
	Conditional?			NO							
	Urban Climate Change Resili	Regional	Clima te Ro ck ef ell		Meeting needs of Asia for basic and	Climate-resilient urban infra		Asian cities	YES[2]	**Grants fund (ADB)**	Click here or

					economic infra., resilience, climate change effects within medium-sized cities in Asia, reducing the vulnerability of urban poor.	Urban adaptation private sector engagement partnership, climate finance	$150 million in grants leveraging more than $1 billion in investments from public, private and municipal sources		ecosystems strengthening and services; water management		Click here
FF9	***Public or Private***			PRIVATE							
	Conditional?			NO							
	Global Environment Facility (GEF)	Assembly, the Council, the Secretariat, 18 Agencies a (STAP)	climate and conservation finance	39 donor countries	Catalyzing action on the environment through strategic investments and partnerships, also reducing poverty, strengthening governance, achieving greater gender equality	Biodiversity International Waters Land degradation Chemicals and waste Cross-cutting issues [e.g., sustainable forest management]	over $18.1 billion in grants and mobilized an additional $94.2 billion in co-financing for more than 4500 projects in 170 countries	Developing countries and emerging economies	YES biodiversity	**Grants Facility (World Bank trustee)**	Click here
FF10	***Public or Private***			PUBLIC							
	Conditional?			NO							
	Green Climate Fund	United Nations [UNFCCC]	Climate Finance	194 countries party to the UNFCCC	Mobilizing funding at scale to invest in low-emission and climate-resilient development projects and programs in developing countries, with particular attention on most vulnerable populations	Energy Transport Efficient buildings Land use and forests Climate-resilient livelihoods Health, food, water security Resilient infra Resilient ecosystems	pledges worth USD 10.3 billion	Global, focused on Least Developed Countries [LDCs], Small island developing states [SIDS] and the African States	YES Mitigation, cross-cutting and adaptation	**Grants, debt, equity, guarantee fund [World Bank interim trustee, UNFCCC]**	Click here

FF11	*Public or Private*			PUBLIC							
	Conditional?			NO							
	Climate Bonds Initiative	Trustees, Advisory Board, Panel and technical committees	Climate Finance	CH, Blomberg, Rockefeller F., Nat. Aus. Bank, Bank of Am., HSBC, UK, Frederick Mulder	Foundation, European Climate Foundation, The Sainsbury Family Charitable Trusts, Martin International, KR Foundations.	Green and climate investments	$100 trillion bond market for climate change solution	Global	YES Natural resources like forestry and fisheries, and utilities like water	**Green bonds: securitization, securitization Roundtable, covered bonds, city bonds, Sukuk**	Click here
FF12	***Public or Private***			PRIVATE							
	Conditional?			NO							
	World Bank Green Bond	World Bank Treasury	Climate Finance	Fixed-income investors	Raising funds from fixed-income investors to support World Bank lending for climate change mitigation and adaptation projects	Mitigation projects Carbon reduction through reforestation and avoided deforestation Adaptation projects Flooding protection (reforestation and watershed management)	2-4 billion	Global	YES Flood protection [reforestation and watershed management], slow down deforestation and sustainable forest management	Debt bonds	Click here

FF13	*Public or Private*					PUBLIC					
	Conditional?					NO					
	Global Green Growth Institute	embedded teams in each country	Climate Finance	Australiua, Denmark, Germany, Indonesia, Korea, Mexico, Norway, Switerland, UAE, UK	Attaining a newmodel economic growth, environmental sustainability in developing countries and emerging economies	Energy Water Land Use Green city development	USD ≈ $30,000,000 yearly	Global	YES Water and sanitation and landscape restoration, in forests, waterways, agrarian, coastal and marine systems	**Grant [GGGI]**	Click here

6.3 Annex 3. Examples of successful Financial Instruments

CODE	TYPE	NAME	MANAGING INSTITUTION	INVESTORS	MECHANISM	DESCRIPTION	MAGNITUDE OF THE TRANSACTION	HAS SUPPORT ECOSYSTEM RESTORATION? Yes,/No—WHICH? (Watershed, Biodiversity, Forest, Other)	DETAILED INFO
FI01	GREEN BOND	Suzano Pulp and Paper Green Bond	Bahia Sul Holdings. JP Morgan and Banco Santander were the co-global coordinators.	The offer was intended for US and European institutional and single investors in trading markets.	The bond was a standard structure fixed income issue. It is structure according to Green Bonds Principles (the use of proceeds, the process of project evaluation and selection, the management of proceeds, and reporting)	Bond to finance projects focused on sustainable forestry, conservation, water management, energy efficiency and renewable energy developed by Suzano in Brazil. It is believed to be the first forestry-related green bond issued in Latin-American.	The bond had an issuance amount of USD 500 million, with a maturity date of 14 July 2026. The book-building process established the 5.75% coupon and a 5.875% yield, which will be paid twice a year starting from January of 2017.	Forest, Biodiversity and Watershed restoration, management and conservation	Click here
FI02	GREEN BOND	Kommuninvest Green Bond	Kommuninvest, the Swedish local government debt office (Sweeden)	First bond demanded by green investors (67%) and mainstream investors (33%)	Raise funds from fixed income investors to support lending for local and regional governements investing in mitigation or adaptation projects.	“Eligible Loans” primarily promote the transition to low carbon and climate resilient growth. To a smaller extent (max 30%of issued volume) projects ecosystem restoration projects and enviromental management.	First bond size USD 600 million, 1.50% payable semi-annually (15 March 2016)	Forest, Biodiversity and Watersheed restoration, management and conservation	Click here
FI03	CATASTROFE BOND	Coral Reef Insurance policy	Local government Quintana Roo (Mexico), Afirme Seguros (insurance company) and Nature Conservancy.	It is a insurance product, purchased by Local Governement and reinsurer by reinsurer Swiss Re Ltd.	It is a parametric insurance product, which ex ante agrees to make a payment upon the occurrence of a triggering event. A parametric insurance type does not indemnify the pure loss.	In the case of Quintana Roo Coral Reef, the instrument will be triggered if wind speeds above 100 knots, with a payout split of 50% for reefs and 50% for beaches. The government pays the insurance with public budget, which includes taxes to the tourist sector.	It offers up to $3.8 million to repair hurricane damage	Biodiversity management and conservation	Click here

FI04	DEBT FOR NATURE SWAPS	Tropical Forest Conservation Act (TFCA) EEUU	U.S. Agency for International Development (USAID)	It works as a mechanisms for aliviating extensive foreing debt own by the United States	TFCA is implemented through bilateral agreements with eligible countries. Elegible countries relieve debt in US dollars by generating local funds in local currency to support NGOs and Local communities	Addresses the rapid loss of resources and biodiversity in developing countries that were heavily indebted to foreign creditors. The TFCA and EAI programs are now inactive in terms of negotiation of new agreements.	As of July 2013 (the date of the last appropriation), approximately $223 million in congressionally appropriated funds have been used to conclude 20 TFCA debt treatment agreements with 14 countries.	Forest, Biodiversity and Watershed restoration, management and conservation	Click here
FI05	DEBT FOR NATURE SWAPS	Madagascar Commercial Debt-for-Nature Swaps	WWF and multiple donnor countries	Magadascar is considered as heavily Indebted Poor Country (HIPC).	The early swaps involved purchase of commercial debt at 50% of face value (1989-96). IN 2000, debt for nature swaps were structured as a part of a National Enviromental Action Plan by a Sustainable Financing Commission	Biodiversity value of Madagascar's natural resources is universally recognized. Ten protected areas offer ecotourism benefits and twenty protected areas provide hydrological services, including irrigation and potable water.	Madagascar was declared eligible for HIPC in 2000 and projected to receive the equivalent of $62 million annually in debt relief from bilateral and multilateral creditors.	Forest, Biodiversity and Watershed restoration, management and conservation	Click here
FI06	TRUST FUNDS	Amazon Fund	The Brazilian Economic and Social National Development Bank (BNDES) entrusted to manage funds	Donations from foreign governments and companies, particularly Norway, Germany and the Brazilian Oil Company (Petrobras)	Independent legal entity and investment vehicle to help mobilizing, blending, and overseeing the collection and allocation of financial resources for environmental purposes. The Amazon Fund has also pioneered results-based finance for REDD+	Funds are spent in accordance with the priorities of Brazil's Plan of Action for the Prevention and Control of Deforestation in the Amazon (PPCDAM) as well as its National Plan for Climate Change (PNMC).	Between 2008-2018, US 1,2 Trillion Dollars were deposited in the Amazonian Fund	Forest, Biodiversity and Watersheed restoration, management and conservation	Click here
FI07	ENVIRONMENTAL IMPADCT BOND	Environmental Impact Bond for Green Infrastructure	DC Water and Sewer Authority (DC Water).	Calvert Foundation, and Goldman Sachs	The DC Water Environmental Impact Bond is a tax-exempt bond issuance where a portion of the payment to investors is dependent on the outcomes of the intervention.). This	DC Water serves 2.3 million customers within 725 square miles. The proceeds from the EIB will provide the upfront capital needed to construct DC Water's inaugural 20-acre green infrastructure project in the Rock Creek sewershed (Rock Creek Project A or RC-A	The first EIB was issued for $25 Million repaid in five years, at 3,3% interest rate. Investors will get additional 3.3$ million	Watershed restoration, management and protection	**Click here** **Click here**

					project uses a recurring revenue model. DC Water utility rate payors pay for access to water services in recurring payments				
FI08	RESILIENCE BOND	Forest Resilience bonds	Blue Forest Conservation - US Forest Service	Supported by the Rockefeller and Packard Foundations and in partnership with Encourage Capital and World Resources Institute	Investors provide upfront capital with public and private beneficiaries then making contracted payments based on the water, fire, and other benefits created by the restoration activities. The Bond utilizes investor capital and cost-sharing among beneficiaries.	Beneficiaries of the restoration work such as US Forest Service, water and electric utilities, and state governments make cost-share and pay-for-success payments over time (up to 10 years) to provide investors competitive returns based on the project's success.	The first FRB pilot raised $4 million for a $4.6 million restoration for Tahoe National Forest. Investors expected a 1% rate of return and two market-rate investors with a 4.5% rate of return. Future deals could range from $15 million to $50 million.	Forest restoration, management and conservation	Click here Click here