OPERAs

OPERATIONAL POTENTIAL OF ECOSYSTEM RESEARCH APPLICATIONS

THEME ENV.2012.6.2-1

Milestone 2.6
Draft Exemplars Study Design Description

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Initial synthesis of submitted Draft Study Designs for OPERAs Milestone 2.6

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This document, the Exemplar Draft Study Designs, represents Milestone 2.6 in OPERAs, and serves in preparation for the first Deliverable from Work Package 2, the Final Exemplar Study Designs, due to the EU in February 2014. The Exemplars are where policy meets practice in OPERAs; they are the testing grounds for instruments and the venues for collaboration between Work Packages across the project. The Exemplars are currently at various stages in the process of establishing stakeholder partners and preparing to begin project implementation, so these Draft Study Designs are a chance to reflect across Exemplars for lessons learned at this stage, and highlights for possible directions in the future.

The Exemplars were selected over the development of the OPERAs project to illustrate policy relevance, tradeoffs, and thresholds, and be able to test tools and instruments. Further, Exemplars were selected based on their diverse contribution to a set of criteria including geographic scale and location within Europe, ecosystem and land use type, governance, stakeholders, and economic sector. A brief overview of the twelve Exemplars within OPERAs is given Box 1. Details on the study design and the people involved can be found the appendices. To ease the communication and management among the exemplars, these 12 exemplars are grouped into three thematic clusters, each with a point person from Work Package 2:

- Large-Scale Dynamics: **Global**, Europe, and Mediterranean Exemplars (managed by Ariane Walz, University of Potsdam)
- Regional: **Dublin, French Alps, Swiss Alps,** Montado, and **Wine** (managed by Kim Nicholas, University of Lund)
- Aquatic Systems on the Edge: **Barcelona,** Baleric, **Danube**, and Scotland (managed by Meriwether Wilson, University of Edinburgh)

The seven Exemplars in **bold** above are included in this synthesis and the first appendix to this Milestone. The remaining five Exemplars are currently finalizing their Study Designs and will be compiled in a separate Appendix.

- **Exemplar on the urban-rural fringe of the Greater Dublin Region**: The Exemplar investigates the potential of incorporating ES/NC factors into the planning and management of expanding cities, with a special emphasis on green infrastructure and green innovation. Critical thresholds between the provision of rural versus urban ES, common to all European cities, are the key issues under investigation.

- **Sectoral exemplar on Wine production in Europe**: Wine production and the landscapes and cultural systems it supports provide highly valued ES. However, a way to communicate responsibly grown and made wines to consumers is lacking, including assessing their impacts on ecosystem services. This Exemplar will further develop, implement, and test two existing instruments to assess life-cycle impacts of vineyard practices.

- **Multi-biome exemplar on the multi-scale implementation of environmental policy in Scotland**: The Scottish Government puts land use and environmental concerns high on its agenda, and strongly promotes the operational use of the ES/NC concept. In close collaboration with relevant decision-makers and stakeholders, this multi-biome exemplar seeks to test a variety of valuation tools and governance instruments applied to Scottish targets for land use, marine stewardship, and climate change, from the national level to local implementation on the community level.

- **Trans-boundary Danube Exemplar on River and Wetland Management**: Through the multi-purpose restoration of wetlands and fishponds along the Lower Danube, habitats as well as livelihoods could be supported over the past decades. Here, the ES/NC concept will be used to estimate direct and indirect socio-economic benefits, such as flood mitigation, enhancement of water quality, fishing grounds, and carbon sequestration, across the Romanian-Bulgarian border in order to optimize the management and governance of the site supported by the WFD and the Habitat Directive.

- **Marine/coastal Exemplar on co-beneficiary management of seagrass meadows for Blue Carbon on the Balearic Islands**: Besides many beneficial effects, seagrass meadows are able to bind Carbon for millennia in the thick layers of their soils. However, they rank among the most threatened ecosystems on earth with an increasing risk of carbon emissions from the submarine C deposits in addition of loss of carbon burial capacity. Using an ES/NC approach, the potential and the security of the Blue Carbon sink will be quantified and brought in context with the known co-benefits by an evaluation of the effect of management policies including the EU Directives on Habitat, and the Framework Directives on Water and the Marine Strategy.

- **Exemplar on urban dunes in Barcelona**: Coastal storm protection, urban/peri-urban recreation, economic HOTSPOTS and a rich ecosystem, urban dunes provide a portfolio of valuable ecosystem services and can, if not naturally occurring at the sites of interest, be engineered in the form of hybrid dunes. The management of the dune system is COMPLEX, and the elicitation of the multi-dimensional value of such dunes based on the concept of ES/NC enhances a cost-effective management with multiple co-benefits.

- **Swiss Exemplar:** Changing management and climate change will alter the provision also of cultural ecosystem services in Swiss mountain regions. Here, supply and demand of cultural ecosystem services will be mapped and then be approached by back-casting envisioned shared future visions. By combining quantitative modeling and interactive 3D landscape visualization tools, stakeholders will learn about preferable futures and tradeoffs based on quantitative indicators and rigorous pictures associated with their vision.

- **Global Exemplar on Mechanisms for Climate Protection and Habitat Conservation**: Climate change and the loss of habitats and biodiversity are fundamental threats to the functioning of socio-ecological systems worldwide. Despite strong inter-connections, the development of global mechanisms to mitigate and slow down both processes is taking place almost in parallel with little interaction between the two communities. Seeking for balanced solutions that avoid jeopardizing either of the two goals or the interests of local communities through global mitigation mechanisms, we use a multi-scale ES/NC based approach and test policy and market instruments for their multi-dimensional impact at global as well as at local scale.

- **Circum-Mediterranean Exemplar**: Recent socio-political changes in nearly all Mediterranean countries offer the opportunity to incorporate explicitly the ES/NC concept into policy making. The application of a generic tool to analyse scenarios of policy options to reduce land abandonment and their delivery of ES (i.e. agricultural products, risks of extreme events, integrity of semi-natural ecosystems, water availability/runoff, carbon storage) while accounting also for the legacy of the long land use history of the Mediterranean will support the identification of risks for human livelihoods, as well as the opportunities for sustainable use of the ES/NC for people around the Mediterranean.

- **Local, cross-sectoral Exemplar in a rural and peri-urban area of the central Alps, looking at in- and outside effects of landscape management and infrastructure development**: This exemplar will address the knowledge and operational gaps in the integration of ES/NC concepts in planning documents and the permitting process for infrastructure and peri-urban development, in order to promote cross-sectoral dialogue for optimization of land use decisions and land management adaptation (agriculture, forestry, tourism, natural hazard mitigation). A second focus of this Exemplar is spatial trade-offs between up- and downhill beneficiaries, with crucial insights into best practices in small-scale governance structures for ES provision..

- **Conservation of cultural landscape in the LTER region of Montado in Portugal**: The ecological as well as the cultural heritage of the cork trees is a key asset of the Montado landscape. Climate change, but also changes in rural land management and pollution are in combination crucial threats pushing this traditional landscape towards an economic as well as ecologic tipping point. Bringing the ES/NC concept into practice, productive, ecologic as well as cultural aspects of socio-ecological system will be combined and promote an improved management.

- **Pan-European Exemplar on Regulative Directives**: EU regulative directives may lead to unexpected tradeoffs between ecosystem services, leading to policy conflict as well as providing potential for synergies between directives and policies. This exemplar will provide an operational example of the identification of such policy conflicts and synergies using Module KNOWLEDGE methods for the entire EU territory in combination with a professional stakeholder dialogue involving policy representatives from the different DG's. The exemplar aims providing a showcase of operational methodology to identify potentials for achieving more synergistic policy design.

Box 1: Brief Overview of the twelve OPERAs Exemplars

From the analysis of the drafts submitted so far, the following recommendations are suggested for

continuing to revise and improve the Final Study Designs to be submitted to the EU in February:

1. Ecosystem services are the unifying concept across all of OPERAs; in most cases these would benefit from being described and specified in more detail in the Study Designs. In particular:
   - In order to translate from science into practice for stakeholders, OPERAs research will need to aim to explain the contribution that ES make to human well-being, to make them relevant to stakeholders.

   - While the proposal and DOW heavily emphasize valuation, thresholds, and tradeoffs between ES, most Study Designs do not address these at present. Exemplars with these elements in focus should highlight them for the Final Study Design.

   - It is essential that everyone in OPERAs uses a consistent system to refer to ecosystem services. The PMT has agreed that this system is the CICES ecosystem service classification; using it consistently will promote understanding and collaboration throughout the project.

2. Stakeholder involvement in research design is an essential feature of OPERAs, and there appear to be several opportunities to enhance this feature in the Exemplars in order to achieve our stated goal of achieving "practical application of Ecosystem Services in policy and practice" through the "interactive, adaptive learning approach" in the project Description of Work. In particular:

- Many Draft Study Designs currently do not include "a formal launch workshop" with stakeholders, which as described in Task 2.2.1 applies to all Exemplars. Developing such a workshop in each Exemplar will be important to ensure that "the stakeholders will build the constituency for tools and instruments to be developed, and specify the design of these tools and instruments for their exemplar."

- Many Draft Study Designs could benefit from building in more ongoing stakeholder involvement throughout their projects (not only at initial and final stages) into the study design, to achieve the "iterative learning process between end-users, stakeholders, researchers, and developers of tools and instruments" (Task 2.2.3 for all Exemplars). This is important to ensure that actual stakeholder needs (for management, policy, and other decision-making) are being met through OPERAs research, in addition to academic research questions being answered. This approach will promote the likelihood that OPERAs will succeed in actually operationalizing ecosystem services.

3. Many Draft Study Designs have research questions that are often still at the general topic level. For the final draft, these will benefit from being operationalized into measurable variables and questions that are focused enough to be answerable during the project period.

4. Many Draft Study Designs are presently a bit difficult to understand as a stand-alone document, because they assume previous project knowledge and do not explain the tools and instruments that will be used in sufficient detail for the reader to understand the Exemplar based on the information given. For the final Study Design, it will be important to include more explanation that shows what instruments can do, and how they will be used to meet stakeholder needs. (Much of this information has already been compiled by WP4, and could be easily added to the Study Designs to make them more complete.) Adding the specific names of partners and institutions, as well as instrument and general Exemplar names, will greatly increase clarity.

5. At the moment, many Draft Study Designs are still developing linkages with other WPs in OPERAs (besides WP4, Instruments). It will be important to help ensure that opportunities to collaborate between Exemplars are developed and promoted (to meet the goal of "information flow between Exemplars" in Task 2.2.3). It will also be important to ensure that WP3, Knowledge, WP 5, the Resource Hub, and WP 6, Outreach and Dissemination, develop strong linkages to Exemplars to make sure they are well integrated in the process.

6. Currently, the drafts do not include references; these should be added to the final draft where appropriate.

7. Finally, for reporting purposes, it is essential that all Exemplars use the provided templates. Exemplars will always have the opportunity to comment on and suggest changes to the template design ahead of time, but once they have been established, it is important to use the template to minimize administrative time in compiling reports consistently.

There will be an All-Exemplars call in January 2014 to discuss these suggestions and allow Exemplar leads to reflect on the Draft Study Designs and prepare revisions for the Final Study Design for Deliverable 2.1. Addressing these issues will help ensure that the OPERAs exemplars are well positioned to conduct an interesting and important range of research across and beyond Europe that succeeds in operationalizing ecosystem services."

Work Package 2: Practice
Task 2.2Exemplars
Milestone 2.6 Draft exemplars study design

Draft Exemplars Study Design:
Hybrid Dunes - Barcelona Exemplar

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November 2013

1. Dream Abstract

Can an ES/NC based management strategy be the way to boost the management and conservation of the Mediterranean urban dune ecosystems?

A great part of the sand beaches on the Mediterranean coast of Spain, France and parts of Italy endure the combined impacts of intensive recreational use, increasing erosion and flood risk, and mono-functional management practices. So, there is a need to go beyond the ICZM concept and test new strategies based on the ES/NC vision, taking into account coastal morphodynamics, dune ecology, shore governance structure, the sustainable economic use of sand beaches and its recreational use by millions of citizens.

This exemplar will test some real experiments on urban dune management on the Metropolitan Area of Barcelona and other urban beaches, and will also conduct a systematized analysis of the coastal defence and regeneration projects executed by the central administration on the shore of Catalonia during the last 20 years.

Some of the desired results are:

- Finding new ways to share the cost and repayment of the coastal defence and dune regeneration works.
- Provide objective methods to assess the efficiency of management decisions, coastal defence works, and governance structures.
- Point out new urban dune conservation and management strategies and their linked research needs.

This exemplar will show how conservation and management practices, when conducted under the ES/NC views, can promote economic efficiency and human well being instead of increasing the economic burden of nature conservation.

2. Study Rationale

The coast of Catalonia, as the coast of the Mediterranean shore of Spain, France and Italy, has undergone a process of intense recreational use during most of the year alongside a process of shore urbanization. So, most of the dune ecosystems endure a profound alteration of their basic processes and can be considered as "urban". The increase of the probability of extreme storm events and their associated erosion and flood risks, impose a new challenge on an already sensitive system which sustains most of the tourism based national economy. The prevailing managing approaches have been traditionally monofunctional and aimed to control erosion processes, and lack links to conservation ecology, societal issues or local stakeholders. The new shore act promotes an overly simple classification between urban and natural beaches.

An ecosystem services approach is a good opportunity to improve governance structures, to explore new ways to share the costs and benefits of coastal management and conservation ecology in a more efficient way, and to engage the millions of people who enjoy the coastal dunes each year The ES/NC concepts will also promote going beyond the overly simplistic dichotomy of "urban" and "natural" beaches on the new Spanish shore act, thus proposing the promotion and management of ecosystem processes and functions.

3. Exemplar Selection and Description

To solve the challenges posed by the "urban" or "hybrid" dunes, there is a need to go beyond traditional conservation ecology methods and widen the scope of prevailing engineering coastal defence practices to include urban and "hybrid" dune systems. New ways should be explored not only on the grounds of governance, but also in the search for new standardized ways to optimize economic efforts on beach management in a new

scenario where local economic and social stakeholders share their visions with coastal engineers and first line government decision makers.

The ES/NC concepts will provide an objective and rigorous methodology to manage the abundant tradeoffs which emerge when analyzing the dune and urban sand beach systems.

Although the scale of the exemplar is fairly local (the Metropolitan area of Barcelona, and some other small projects on Catalonia), the problem to solve is of European scale (the Mediterranean shore of Spain, France and Italy).

The policy context of this exemplar is quite relevant as it will propose new ways to improve policies, introducing the concepts of ES/NC on law environments and promoting new insights to the ICZM concept.

As the Mediterranean sand beaches are clear economic hot-spots (the main source of tourism economy), there is a good chance to identify and solve different tradeoffs and management challenges.

4. Research Questions

- Under which circumstances can the "hybrid dune concept" be a strong enough alternative to compete with the traditional solutions of beach nourishment and hard coastal defence engineering techniques?

- How can we improve the decision making process to select the best alternatives for coastal defence projects and dune management strategies?

- Which are the threshold levels of artificiality (hybrid concept) that can be afforded by the dune ecosystem processes? And how can this concept are applied to promote dunes on urban beaches?

- How can the ES/NC concepts improve the legal environment of coastal management? (For example, is it possible to stop speaking of natural/urban beaches and start protecting and promoting the ecosystems processes and functions which provide the ES?)

5. Exemplar Goals

- Conduct some small scale real dune management experiments on urban dune management, and analyse their performance under a standardized method.
- Define and refine the concept of urban dune on the grounds of ecosystem processes.
- Provide a standardized method for assessing existing coastal defence and beach nourishment projects; and a set of decision trees to better evaluate the selected alternative on future projects.
- Provide a first best practice manual of Mediterranean urban beaches.

6. Linking Stakeholders, Instruments, and Ecosystem Services

1. Stakeholder description

There are at least three stakeholder groups:

- Decision makers from the administration of coastal defence (until the new 2013 shore act, it was exclusively competence of central government, and now, with the new modified shores act, local stakeholders are allowed to intervene) with the responsibility to protect beaches from erosion and floods from extreme storm events. They also have the responsibility to optimize economic efforts (public or private money).
- All the stakeholders of the tourism economy, and the local administrations which are more closely engaged to this activity (mainly municipalities).

- The huge mass of consumers (millions of tourists and local visitors) and conservation NGOs.

2. Identification of stakeholder needs

The needs vary between stakeholders:

- Decision makers and project designers need to choose the best defence and dune management alternative in terms of social use, economic-touristic use, maintenance of ecological processes and coastal defence efficiency.

- Local economic stakeholders need to maintain beaches in front of storms to keep their business going. Helping to create dunes can be considered as a way to promote reputation.

- Consumers, which are of different levels (local residents, day and weekend visitors, tourists) can be the promoters of conflicting uses with ES/NC multifunctional use. So, there is an urgent need to inform about best practices when visiting beaches and their dunes.

- There is a need also to explain to environmental NGOs that there is a need to cut trees for rejuvenation projects to promote dune habitat. Cutting trees is usually seen as extremely negative by NGOs.

Table 1. Exemplar Plan to Address Stakeholder Needs and Improve Ecosystem Services Through Instruments.

Stakeholder Need	*Instrument to address need*	*Ecosystem Service(s) Addressed**	*Anticipated Outcome*
Anyone willing to pay design or make decisions over coastal defence and dune protection will need a decision tree and a	Governing ES/NC, policy analysis. ES/NC quantification,	R9R10 Flood and Storm protection	Decision trees. Customized protocol to choose/assess the

proper instrument to help to choose the best strategy.	links between ecosystems, biodiversity and ES functions. CBA (IODINE) MCDA-mDSS Collaborative web platform Business information tool-LCA		best project alternative.
Trade-off between conflicting beach and dune uses (mainly by consumers).	Social media, static in situ information with QR codes, crowdsourcing projects to follow dune recolonization processes. Online surveys, Volante CANVAS tool.	P13, ground non-drinking water. P20 Mass stabilization and control of erosion rates. R9 Flood protection. R10 Storm protection. C2, C3, C4, C6, C7,C10,C11	An information campaign to inform consumers. Crowd sourcing project on dune re-colonization processes.
The need to know the economic efficiency of	CBA (IODINE)	P13, Ground water for non-drinking	The assessment of the efficiency of

beach and dune protection, and ways to share the costs/benefits.	Governing ES/NC, policy analysis.	purposes. P20 Sand as facility. R9 Flood protection. R10 Strom protection. C2, C3, C4, C6, C7,C10,C11	the economic effort. Ways of participated projects, with different stakeholders involved.

**Following the classification of Ecosystem Services from CICES v.4.3 (January 2013), contained in the "CICES" tab of the BluePrint Protocol.*

7. Collaborations within OPERAs

Work Package 2: Practice

There is a chance to understand Posidonia meadows as a way to protect the coastline in front of erosion.

Work Package 3: Knowledge

This is the most populated area of collaborations:

- ES/NC quantification, links between ecosystems, biodiversity and ES functions.
- Synergies and trade off analysis between different ecosystem services/natural capital.
- Social valuation of ES.

- Governing ES/NC, policy analysis.

Work Package 4: Instruments

- Scenario tool.
- CBA (IODINE)
- mDSS
- TESSA
- Volante Canvas
- ES Indicator
- OE (Our Ecosystem).

Work Packages 5 & 6: Resource Hub and Dissemination

The Resource Hub has a central role on this exemplar, as it is most exclusively oriented to real world users and managers involved on sand beach management, tourism, and the sustainable recreational use of sand dunes.

By now we are having problems with stakeholder involvement because of the data of the first Resource Hub meeting. All public administrations in Spain are especially busy during the period of November-December.

So, the different administrations have decision makers, managers and technicians who know the project (and what is most, probably the Metropolitan Administration of Barcelona is willing to pay for a project of dune rejuvenation and dune creation), but they are not so involved on the general concepts of ES/NC and on the global OPERAs project. By now they know about the European level involvement, but they have very little knowledge about the Resource Hub purpose.

So, there is a need to keep in touch with the outcomes of the Resource Hub first meeting and find ways to engage them beyond the specific character of the local projects.

There is a need also to make some progress with the economic stakeholders linked to tourism activity. The proposed international workshop on urban dune management proposed to be held on the Barcelona Metropolitan Administration's installations on 2014 can be an opportunity to engage this sector of stakeholders.

Parallel to the beginning of the physical works on dune rejuvenation/construction, there will be a campaign of information based on social media platforms.

8. Timeline

Date	**Description of WP2 Milestone and Deliverables**	**INDIVIDUAL EXEMPLAR MILESTONES**
Dec 2012		
Jan 2013		
Feb 2013		Normalized assessment of existing projects.
Mar 2013		
Apr 2013		
May 2013	MS2.1 Review of exiting ES/NC assessment protocols, and MS 2.2 Draft Blue Print Protocol for systematic reporting of Exemplars and Meta Analysis	
Jun 2013		
Jul 2013	MS2.3 Meta Anal: a) Preliminary report on knowledge gaps and demand for instruments reported to WPs 3 + 4, gaps, b) work of existing exemplars, c) results on gaps	
Aug 2013		
Sept 2013	MS2.4 Discuss Draft Blueprint	
Oct 2013		
Nov 2013	MS2.5 Each Exemplar reports with Blueprint Protocol 1.0 and MS2.6 Each Exemplar submits draft study design	
Dec 2013	Exemplar implementation begins.	Executive projects on dune rejuvenation/creation & hybrid dunes for coastal defense approved.
Jan 2014		
Feb 2014	**D2.1 Each Exemplar submits Study Design Description**	Works of dune construction/rejuvenation and coastal defense executed. Normalized assessment of existing projects.
Mar 2014		
Apr 2014		
May 2014		Normalized assessment of existing projects
May 2014	MS2.9 Each Exemplar reports with Blueprint Protocol 2.0	Normalized assessment of existing projects
Jun		

Jul		
Aug		
Sep		
Oct		Probable data for the Workshop of urban Dune Management on the Metropolitan Administration of Barcelona's installations.
Nov		
Dec		
Jan 2015		
Feb		
Mar		
Apr		
May		
Jun	MS2.11 Exemplars Interim Report	
Jul		
Aug		
Sep	MS2.13Each Exemplar reports with Blueprint Protocol 3.0	
Oct		
Nov		
Dec		
Jan 2016	MS2.14Evaluation of processes in each exemplar with potential adaptation to the work plan	
Feb		
Mar	MS2.16Decision tree workshops in collaboration w/ Meta-analysis and Exemplars	
Apr		
May		
Jun		
Jul		
Sep		
Oct	MS2.17Each Exemplar reports with Blueprint Protocol 4.0	
Nov		
Dec		
Jan 2017	MS2.18Contributions to the Resource Hub	
Jan 2017	MS2.19 Final OPERAs Exemplar Conference	
Feb	**D2.3: Compilation of reporting of all exemplars for further evaluation and synthesis**	

Work Package 2: Practice
Task 2.2 Exemplars
Milestone 2.6 Draft exemplars study design

Draft Exemplars Study Design:
DUBLIN: URBAN RURAL FRINGE Exemplar

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November 2013

1. Dream Abstract

Fingal in North County Dublin contains a rich variety of ecosystem services including coast, upland, island, estuaries, rivers and a variety of parkland, riparian and open space green infrastructure, which are valued by the community and various stakeholders for a multiple of reasons. The county however has experienced significant development pressure during Ireland's recent construction led boom, and this development pressure continues. Residents and communities have expressed resentment that Fingal is becoming "a dumping ground" for development for the wider city area (RPS (2013)) with a planning approvals granted, or being sought after, for large urban housing development, strategic waste and energy infrastructure, airport, retail centres and motorway infrastructure. An analysis of the landscape of socio-cultural values of Ecosystem Services (ES) may provide a means to inform decision making for better outcomes in this spatial planning context. The analysis will comprise of a (i) discourse analysis of planning documents including submissions on planning applications and the County Development Plan (CDP); an analysis of the activities, documents and social media output of local NGOs; a review of oral and photographic archives connected to ecosystem services (agriculture, fisheries, outdoor activity etc…), (ii) mapping of markers for socio-cultural value across within the landscape (storyboards, walking trails, look out posts, etc.,), (iii) mapping of stakeholders (iv), literature review on the concept of social and cultural values and their importance within decision making and finally (v) a consultation exercise using qualitative and quantitative methods, including Focus Groups and semi-structured interviews to establish the range and ranking of socio-cultural values. Key outcomes of the research is the development of a methodology for the assessment of socio-cultural values at local or project level, and a set of social and cultural value indicators which can be used in the field.

2. *Study Rationale*

Fingal is a dynamic site containing many of the issues and characteristics of interest to the research group: urban-rural fringe, rich and varied ES baseline, development pressures, potentially contested issues such as waste water infrastructure and deep water port, recent demographic changes and good demographic mix, and newly established communities moving into older, more culturally established communities. Fingal has a rich variety of ecosystem services throughout the county including Provisioning services e.g. agriculture, horticulture and fisheries; Regulating services, such as flood protection and water quality maintenance; and Cultural services, such as the recreation, aesthetics and cultural identity offered by the landscape of the county including upland, coastal, rivers, parkland and 27 EU designated sites. However the county's ecosystem baseline is under constant pressure from development. An analysis of the landscape of socio-cultural values of Ecosystem Services (ES) may provide a means to inform better outcomes in decision making in this spatial planning context. Fingal County Council has established a Green Infrastructure Strategy within the Fingal County Development Plan. This research will assess the socio-cultural values of the public, users, practitioners, stakeholders and public representatives within the context of this strategy. The strategy will be used as the guiding framework for the assessment of SCV attached to selected ES settings located in Fingal.

3. *Exemplar Selection and Description*

Fingal is located in the north of Dublin, Ireland, is the second largest of the four Dublin counties and is the most westerly point in Europe. The county has a population of 270,000 approximately. During Ireland's economic boom the county experienced the fastest increase in population in Ireland and three times the national average (2002-2006). Fingal is still a relatively new local governance area having been established in 1994 but it is a county that has experienced huge development, which has placed pressures on infrastructure service delivery and on the receiving environment. Fingal is sited along the coast which has a high landscape quality and is considered the most important recreational and biodiversity resource for the county. The county is host to 27 designated sites, including Natura 2000 designations, coastal, Ramsar, and Natural Heritage Areas.

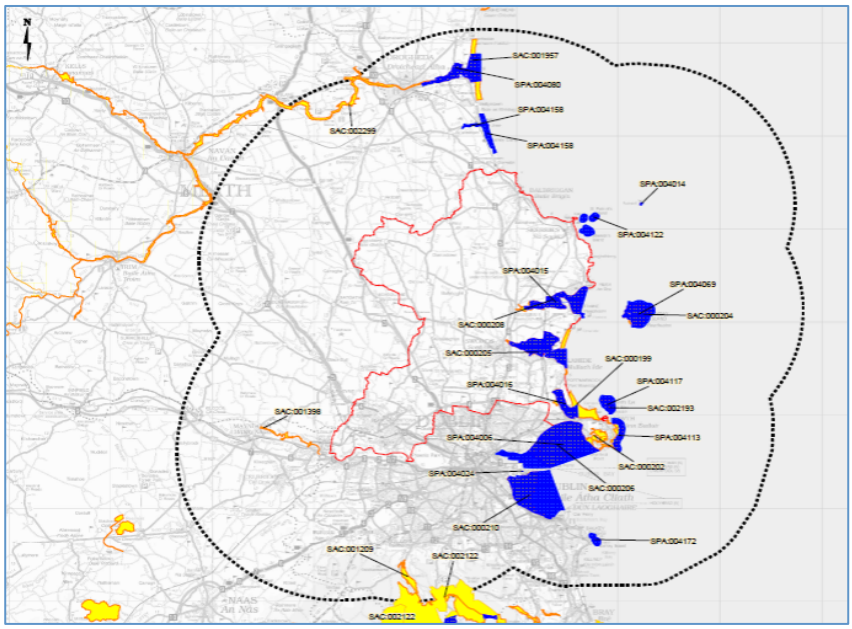
Table 1: Key Green Infrastructure Strategy Target Issues
(Green Infrastructure Strategy CH 3, Fingal County Development Plan 2011-2017)

Biodiversity sites	- Designated Shellfish Waters - Fingal Ecological Network including the following: Core Biodiversity Conservation Areas: Ramsar sites, Natura 2000 sites (SACs and SPAs), NHAs, Statutory Nature Reserves, Refuges for Fauna, Annex I habitats outside designated sites, habitats of protected or rare flora - Ecological Buffer Zones - Nature Development Areas - River Corridors along major Rivers. - Areas within 100m of erodible coastline
Parks, Open Space and Recreation	- Lands zoned open space and/or in use as public open space
Water	- Watercourses including rivers and streams - Riverine Floodplains - Coastal areas liable to flooding - Groundwater Source Protection Areas
Landscape	- Special Amenity Areas on Howth Head and in the Liffey Valley - High Amenity Areas - Highly Sensitive Landscapes - County Geological Sites - Public Beaches

Many coastal fishing and tourism villages have experience development pressure in recent years. The upland and rural areas of Fingal are largely undeveloped and remain important for areas for agriculture and horticulture. The open countryside is also an important amenity for the growing population and is the setting for the many rural small towns and villages dotted across the county, with their distinctive heritage. The county has many public historic demesnes and parklands used for passive recreation by both the local and wider Dublin population. During the boom years a number of historic landscapes were converted to private golf courses and hotels. A key challenge in the

planning and development context is to manage growth, while taking account of the negative externalities on the people living in Fingal. The county is governed by Fingal County Council and is part of the wider Greater Dublin Area which is governed by the Dublin Regional Authority Area. The Council is currently working on compliance with the Water Framework Directive by supporting the large Greater Dublin Drainage Project, including new marine outfall, drainage network and waste water treatment works for the region as whole. This project has been subject to significant opposition from the receiving community. The county has very diverse economic and infrastructural characteristics including large retail centres in newly developed urban areas (Blanchardstown, Swords, Balbriggan), strategic infrastructure (airport, motorway); retail warehousing as well as a range of small rural and coastal villages supported by agriculture, horticulture and fishers. In addition Fingal's coast is a hub for tourism recreation and outdoor activity, particularly for the wider population of the GDA.

Fingal Ecosystem Services and Pressures © Zenit/Flickr



Fingal Special Protection Areas and Special Areas of Conservation (27 sites)

Source: Fingal County Development Plan 2011-2017: Appropriate Assessment

4. *Research Questions*

- Are there differences between privately held and public values for ecosystem services?
- Is it possible to identify indicators of socio-cultural values within a given setting?
- Is the inclusion of an Ecosystem Service Valuation approach to public consultation in planning beneficial for decision making – do socio-cultural values have an influence on decision outcomes?

5. *Exemplar Goals*

- To understand the socio-cultural values of the public and the role of ES within it
- Understand people's knowledge of ecosystem services and how this impacts on values
- To understand if ES can contribute to sustainable planning.

6. *Linking Stakeholders, Instruments, and Ecosystem Services*

1. Stakeholder description

   This research will involve consultation, rather than engagement, with stakeholders. The main focus of the Exemplar research is to assess social and cultural values which are currently unknown.

   The key stakeholders to be consulted were identified via snowball sampling and by identifying stakeholders who were consulted on large scale planning applications including the public, politicians, members of the local authority, NGOs, ENGOs, community organisations, representatives from business, educational, health, community development, residents associations, recreational groups and users of ecosystem services. This Exemplar will commence initial stakeholder scoping research in January 2014.

   Qualitative, deliberative, and qualitative methods will be used to assess the social and cultural values located in the Fingal Exemplar. This will involve Focus Groups and semi-structured interviews, to identify and gather indicators of socio-cultural values across key stakeholders: the general public, public governance, NGOs, community groups, politicians and users of ecosystem services (fishing, agriculture, golfing, tourists/visitors). This is an iterative process and new stakeholders will be identified and contacted during the research.

2. Identification of stakeholder needs

   UCD is not undertaking an ecosystem services assessment. The work in the Exemplar is evaluating social and cultural values expressed by Institutional, community, public, political and NGO stakeholders within the administrative boundary of Fingal County Council.

7. *Collaborations within OPERAs*

Work Package 2: Practice

2.1 (Meta-analysis) and Task 2.3 (Design and Synthesis) –

The Dublin Exemplar is in a group for WP3.2 to examine socio-cultural valuation in other Exemplars including Scotland, the French Alps, and possibly also Montado and Baleric.

Work Package 3: Knowledge

The Dublin Exemplar is undertaking research to assess socio-cultural values (WP 3.2) as they apply to ecosystem services within a planning context.

Work Package 4: Instruments

The Dublin Exemplar intends to evaluate the practical use of the following and then utilise in the field with the support of OPERAs partners:

Information Tools: TESSA: toolkit for rapid assessment of ecosystem services at sites; Volante CANVAS tool and Ecosystem Service indicator development (UNEP-WCMC 2011).

Decision Support Tools: Web-based Scenario Toolbox; Collaborative Web-Platform: User interfaces and visualizations.

8. *Timeline*

Date	Description of WP2 Milestone and Deliverables	INDIVIDUAL EXEMPLAR MILESTONES	ACTIONS TO SUPPORT MILESTONES
Dec 2012			
Jan 2013			
Feb 2013			
Mar 2013			
Apr 2013			
May 2013	MS2.1 Review of exiting ES/NC assessment protocols, and MS 2.2 Draft Blue Print Protocol for systematic reporting of Exemplars and Meta Analysis		• PhD commences. Start literature review to become familiarized with the concept of ecosystem services valuation and social and cultural values. • Meet with key stakeholder Fingal County Council (May 9th) to outline FP7 project and wish for collaboration with Fingal on it.
Jun 2013			• Literature review to become familiarized

			with the concept of ecosystem services valuation and social and cultural values.
Jul 2013	MS2.3 Meta Anal: a) Preliminary report on knowledge gaps and demand for instruments reported to WPs 3 + 4, gaps, b) work of existing exemplars, c) results on gaps		• Literature review on economic valuation methodologies for ecosystem services valuation • Draft paper on ecosystem services valuation methodologies and social and cultural values context
Aug 2013		**Draft paper on valuations methodologies complete**	• Prepare Draft Research Proposal for key stakeholder: Fingal County Council
Sept 2013	MS2.4 Discuss Draft BluePrint	**Draft Research Proposal presented to Fingal County Council**	• Present Draft Research Proposal to Fingal County Council for discussion
Oct 2013			• Meeting with Fingal County Council to agree participation and requirements for the plan and agreement on participation in Prospex User board stakeholder meeting in Brussels (25/29 November). • Literature review on social and cultural values as identified in the literature
Nov 2013	MS2.5 Each Exemplar reports with Blueprint Protocol 1.0 and MS2.6 Each Exemplar submits draft study design	**Draft Exemplar Design and Blueprint completed** **Discussion paper on outline of PhD: social and cultural values within the context of conflict in spatial planning.**	• Literature on social and cultural values as identified in the literature • Prepare paper on the research concept to be tested in the Exemplar: social and cultural values within the context of conflict in planning • Complete Exemplar Design and Blueprint Protocol
Dec 2013 Start: week of 9th December	Exemplar implementation begins.	**Research Plan completed**	• Research Plan: including **stakeholder mapping** against key ecosystem services sites in Fingal (against Green Infrastructure Plan); prioritization of timeline for contacting stakeholders; questionnaire design, **survey design** for documentary discourse analysis and **qualitative interview** design • Identification of **Community Stakeholders** via Community Development office of Fingal CoCo and Identification of **Institutional Stakeholders** via Fingal CoCo • Questionnaire design for two sets of stakeholders (Community and Institutional);
Jan 2014		**Stakeholder interviews commence - Community and Institutional**	• Ethical approval from UCD for research • Set up meetings with selected **Institutional Stakeholders** and continue with Snowball sampling • **Survey/discourse analysis of documents:** Identify planning, NGO and other documents for discourse analysis • Set up meetings with **Community stakeholders** • Commence interviews in the field
Feb 2014	**D2.1 Each Exemplar submits Study Design**	**Design of document survey finalized**	• Interviews in the field • Design survey for discourse analysis of

	Description		planning and NGO documentation
Mar 2014			• Interviews in the field • Commence survey of documents
Apr 2014			• Interviews in the field • Survey of documents
May 2014		**Stage 1 Interviews complete** **Document survey complete**	• Survey of documents • Undertake transcript review and begin analysis of interviews
May 2014	MS2.9 Each Exemplar reports with Blueprint Protocol 2.0	**Report on progress of work and present to Blueprint** **Stakeholder map completed**	• Prepare report on progress for Blueprint • Prepare **stakeholder map linked to specific ecosystem services** (in line with Fingal Green Infrastructure Plan).
Jun 2014		**Report/review on initial findings of research for discussion by UCD: interviews and discourse analysis – social and cultural value indicators**	• Undertake transcript and analysis of interviews • Commence discourse analysis of document surveys • Prepare Report/review on initial findings of research: interviews and discourse analysis – social and cultural value indicators
Jul 2014		**Map of markers of socio-cultural values in the landscape**	• Mapping of markers of socio-cultural values in the landscape • Design of quantitative interview for on-site surveys
Aug 2014		**Commence quantitative research**	• Commence on-site surveys to test the validity of social and cultural values identified through the qualitative research (interviews and discourse analysis) and literature
Sep 2014		**Completion of quantitative survey of the public**	• Analysis of questionnaires
Oct 2014			
Nov 2014			
Dec 2014			
Jan 2015			
Feb			
Mar			
Apr			
May			
Jun	MS2.11 Exemplars Interim Report		
Jul			
Aug			
Sep	MS2.13 Each Exemplar reports with Blueprint Protocol 3.0		
Oct			
Nov			
Dec			
Jan 2016	MS2.14 Evaluation of processes in each exemplar with potential adaptation to the work plan		
Feb			
Mar	MS2.16 Decision tree workshops in collaboration		

	w/ Meta-analysis and Exemplars		
Apr			
May			
Jun			
Jul			
Sep			
Oct	MS2.17 Each Exemplar reports with Blueprint Protocol 4.0		
Nov			
Dec			
Jan 2017	MS2.18 Contributions to the Resource Hub		
Jan 2017	MS2.19 Final OPERAs Exemplar Conference		
Feb	**D2.3: Compilation of reporting of all exemplars for further evaluation and synthesis**		

Work Package 2: Practice
Task 2.2 Exemplars
Milestone 2.6 Draft exemplars study design

Draft Exemplars Study Design: French Alps Exemplar (ESNET)

Sandra Lavorel, Adeline Bierry, Clémence Vannier, CNRS, Grenoble, France
November 2013

1. Dream Abstract

Ecosystem services (ES) lie at the core of the interactions among humans and ecosystems. In this project, we explore the interactions among ecological and societal processes, at multiple spatial and temporal scales, that underpin trade-offs and synergies among ecosystem services in the French Alps. Besides the Grenoble urban region, we focus on three sub-systems: (1) the intensively farmed valley upstream of the city (Grésivaudan), (2) a mixed landscape of forests and grasslands in the Vercors range south of the city (Quatre Montagnes), and (3) a traditional livestock rearing area at high altitude (Lautaret). We use a prospective approach based on scenarios incorporating regional visions for the Alps, current urban planning exercises by public authorities, and a downscaling of European land-use and climate change projections. These scenarios propose spatially-explicit representations of urban development, agriculture, forestry, water and aquatic systems management and nature conservation. Our assessment of these scenarios applies models that capture our detailed understanding of how biodiversity and different ecosystem services are interconnected. Local and regional stakeholders are involved in identifying critical local issues regarding trade-offs among eco-system services and with biodiversity, and in building scenarios. They will then contribute to the evaluation of scenario projections by considering territory-wide ecological costs and benefits associated with alternative land-use pathways. We expect this process to facilitate the ongoing dialogue on sustainable development pathways, including needs for ecological compensation.

2. *Study Rationale*

The French Alps, and especially the Grenoble region, are undergoing an exemplary debate on future regional development that conciliates a dynamic economy and the preservation of exceptional natural assets that also contribute to its wealth, its attractiveness and the well-being of its residents.

Recent ecosystem service assessments have emphasised the need for ecosystem management and policy decisions to focus on multiple ecosystem services, and especially on their potential coincidence or trade-offs with biodiversity hot spots. The incorporation of fundamental understanding of mechanisms underlying ecosystem service and biodiversity trade-offs is a research priority. From the land management and regional development planning perspectives, such an understanding is expected to support policy and decision making by providing information on the consequences of alternative pathways that are potentially based on other key criteria such as energy or economic development, for biodiversity and ecosystem services. In particular, the evaluation of urban development scenarios needs to incorporate among its multiple criteria the consequences, and even potential opportunities, for ecosystem service provision and biodiversity.

To meet this challenge, ESNET models scenario-based changes in ecosystem services using models built around ecosystem services networks that combine multiple drivers and underlying ecological properties and processes at various temporal and spatial scales. The direct involvement of stakeholders from multiple sectors in scenario building and in the assessment of their outcomes ensures relevance to the local debate, and is expected to contribute novel, often implicit or neglected elements to this debate.

3. *Exemplar Selection and Description*

The French Alps exemplar is a regional case study that addresses issues relevant to European mountain regions regarding the interface between a dynamic economy, associated urban and infrastructure development, and natural assets with high values including biodiversity and the provision of multiple regulation and cultural services. As such, it exemplifies a nexus for inter- sectorial interface among policies and for multi-scale governance. While an exemplary case for multi-functional agriculture and forestry, this region is challenged to integrate nature conservation objectives and policies (e.g., Birds and Habitat Directives; EU Biodiversity Strategy to 2020, including its restoration

objectives), with its economic development, and with objectives such as the development of renewable energy (climate policy) and insuring the quantity and quality of water bodies (Water Framework Directive). The Exemplar involves a broad range of stakeholders including decision makers, managers, producers and NGOs representing the main relevant sectors: agriculture, forestry, nature conservation, urban development, tourism and water.

The Central French Alps territory extends around the Grenoble city and three main mountain chains: Belledonne, Vercors and Chartreuse (Figure 1). The study site presents areas with different physical and natural characteristics due to the geology, climate, orientation and elevation that explain the great landscape diversity. These mountain chains offer great natural and semi-natural landscapes and benefit from many conservation policies (like Parc Naturels Régionaux, Réserves Naturelles etc.). In the valley, the flat topography generates urban sprawl around Grenoble city and in the Grésivaudan valley, like in the plateau of Chambaran in the north-west of the study site. The 4450 km² of study site are covered by 56% of forests, 39% of agricultural surfaces and 5% of urban areas. During the 2003-2009 period, the urban areas gain around 33 km², whether 14%, in the majority in agricultural areas. The changes observed depend on the landscape context, thus we will focus on two case study sub-systems: the intensively farmed valley upstream of the Grenoble city (Grésivaudan) and a mixed landscape of forests and grasslands in a mountain range south of the Grenoble city (Quatre Montagnes) (Figure 1).

The Grésivaudan case study has undergone extensive urban and suburban development, with its associated infrastructure and increasing demand for recreation and other amenities. Key issues already raised by regional and local stakeholders include: compatibility of food production with urban expansion and biodiversity conservation objectives (and in particular ecological networks), and the roles played by agricultural land in flood prevention (e.g. as flood expansion zones) and in limiting rock-fall and avalanche danger in the slopes above the valley.

The Quatre Montagnes case study, in the Vercors Mountain, is a mosaic of forests, managed for timber production and/or other amenities including biodiversity and grasslands, used and managed in the context of livestock systems that heavily depend on EU subsidies. Rising peri-urban populations and tourism have increased demand for a variety of amenities (recreation, scenery etc.) while simultaneously putting pressure on

existing agricultural and forest management strategies. Key issues already raised by regional and local stakeholders include: compatibility of alternative grassland management strategies with biodiversity goals related to plant, bird and insect habitat but also to wide-ranging mammals (e.g. wolves); compatibility between goals of agro-environmental schemes (especially for grasslands) and peri-urban expansion; and compatibility of wood production with conservation of forest biodiversity (e.g. emblematic species like Tengmalm's owl).

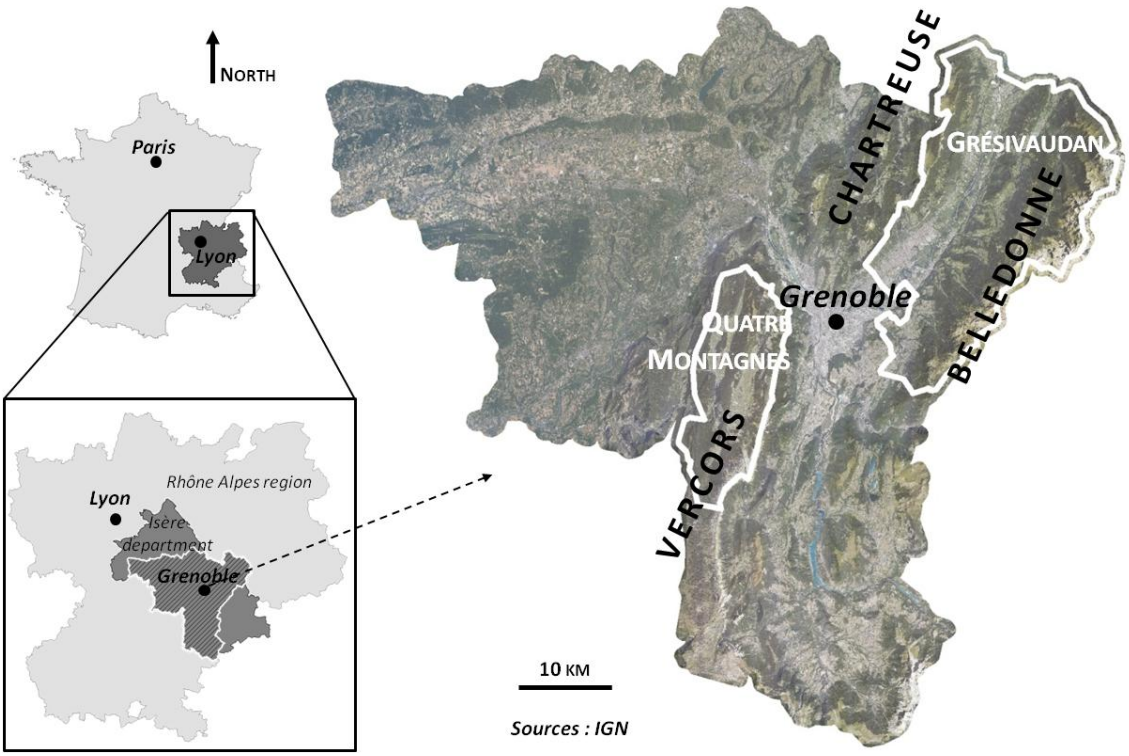


Figure 1 - Study site location

4. *Research Questions*

- What are the networks of interacting ecosystem services in the Grenoble Region? What are the key ecological control mechanisms of functioning?
- What are plausible land use change scenarios given expected climate change and alternative options for urban and peri-urban development? What are their

consequences for agricultural and forest production, biodiversity, natural hazards and recreation activities?

- What are the expected consequences of these scenarios in terms of reconciling biodiversity conservation with the capacity of ecosystems to satisfy for a range of ecosystem services identified as priorities by decision makers and land managers?

5. Exemplar Goals

ESNET aims at assessing alternative futures of ecosystem services networks for the urban area of Grenoble, under combined scenarios of urban development, climate change, and non-urban land-uses. We hypothesize that ecosystem services are interconnected through their underlying ecological mechanisms and operate as networks from the local to the regional scales. These networks are underpinned by fundamental ecological processes as well as by human dynamics. ESNET will primarily address the ecological dynamics determining ecosystem services trade-offs and synergies, while incorporating human dynamics in terms of land-use futures and ecosystem services preferences by local stakeholders and policy makers.

6. Linking Stakeholders, Instruments, and Ecosystem Services

1. Stakeholder description

Participants to the continuous stakeholder process have been selected based on researchers' knowledge of the territory, project partners' (ESNET project) previous contacts and suggestions by key informants, for individuals within main structures involved in territorial management for five socio-economic sectors: forestry, water management, agriculture, tourism and recreation, urban development and land use planning. Within each of these sectors, main stakeholders have been identified from: Governance structures; Local authorities; NGOs; Regional natural parks.

We are organising a series of five workshops with a committed group of stakeholders, to integrate their participation throughout the project:

1st workshop (Completed: 16/09/2013): Identifying regional issues and priority ecosystem services.

15 stakeholders were present, representative of four socio-economic sectors. Stakeholders from tourism and recreation were missing although initially contacted and will join further events.

After a plenary session to present the project, objectives, and timing and to introduce the notions of regional issues ("enjeux territoriaux") and ecosystem services, participants were asked to fill out an individual questionnaire about:

- Regional issues : list the main issues they identify, their evolution over the last 25 years and main consequences
- Ecosystem services : pick main ES (three regulating, three provisioning, and three cultural) from a prepared list, give factors which affect these ES, and link to issues
- ES and territorial management: how they include ES in their work, means of action…

Working groups: Based on background work carried out on key issues by sector, and analyzed to highlight inter- sectorial issues, we selected three topics for working groups. For a set of main issues selected by them, participants are asked: to identify links among issues, and ES and regulatory tools; to identify current tensions and trade-offs.

Working group (completed - 16/09/2013): water resources
Working group (12/2013): land allocation
Working group (01/2014): rural mountain areas

2nd workshop (03/2014) (with participation by Prospex): Building scenarios.

The broad lines of the 3-4 scenarios will have been defined by researchers prior to the workshop, and the objective of the workshop is to translate / downscale them to specific scenarios for model projections and the continued interaction process.

3rd workshop (10/2014): Introduction to ecosystem service models, identification of relevant indicators to be informed for scenarios.

4th workshop (06/2015): Evaluation of modeling results.

5th workshop (01/2016) (with participation by Prospex): Dialogue on development pathways and mitigation options.

2. Identification of stakeholder needs

Table 1. Exemplar Plan to Address Stakeholder Needs and Improve Ecosystem Services Through Instruments.

Stakeholder Need	*Instrument to address need*	*Ecosystem Service(s) Addressed**	*Anticipated Outcome*
Understanding the role of ecosystems for service provision to support management choices and receive financial support or economic benefits for these choices	???	All provisioning and regulation services	
Knowledge about climate change impacts on forests and their multi-functionality, and implication for the management of forest composition	MCDA	Timber production Wood-energy Protection against gravitational risks Carbon storage and sequestration Support for tourism and recreation	
Understanding trans-sectorial consequences of urban and infrastructure development	Regional-scale scenario projections ; compensation and offsets	All (from selected list of 23 ES + biodiversity)	

Communicating to the public about the value of ecosystem management interventions (e.g. forest management, hunting)	Visualisation (Our Ecosystem and 3D)	Landscape aesthetic value Support for tourism and recreation	
Quantification of ecosystem services for regional to national assessment	Biophysical and cultural valuation	All provisioning services Biodiversity cultural value Environmental education	

**Following the classification of Ecosystem Services from CICES v.4.3 (January 2013), contained in the "CICES" tab of the BluePrint Protocol.*

7. Collaborations within OPERAs

Work Package 2: Practice

TBA – collaboration with Dublin, Montado and possibly Scotland

Work Package 3: Knowledge

The French Alps exemplar is directly used for WP2 work on the following topics:

- Networks of ecosystem services: developing concepts and methods for the analysis of ecological mechanisms, including biodiversity effects that underpin trade-offs and bundles of ecosystem services.

- Trait-based models of ecosystem services, including by interfacing with remote sensing products.

- Methods for ES trade-off analyses: a methodological framework is developed to provide an interdisciplinary methodological approach combining a diverse spectrum of quantitative methods that may be selected for (1) detecting ES associations, (2) identifying ES bundles and (3) isolating their drivers, depending on the management and policy context of a given ES study.

- Social valuation of ES :
    - Valuation of ES networks by stakeholders
    - Cultural services: evaluation by stakeholders of connections between their uses and preferences for tourism and recreation, and ecosystem and landscape properties.

Work Package 4: Instruments

Instruments selected for the French Alps Examplar

- Information Tools : Our Ecosystem; 3D visualization (ETH)

- Decision-support Tools: scenarios developed in collaboration with stakeholder, MCDA (with EFI and with local collaborators)

- Management instruments: compensation and offsets (Biotope)

Work Packages 5 & 6: Resource Hub and Dissemination

TBA

8. Timeline

Date	Description of WP2 Milestone and Deliverables	INDIVIDUAL EXEMPLAR MILESTONES
Dec 2012		
Jan 2013		
Feb 2013		
Mar 2013		
Apr 2013		
May 2013	MS2.1 Review of exiting ES/NC assessment protocols, and MS 2.2 Draft Blue Print Protocol for systematic reporting of Exemplars and Meta Analysis	
Jun 2013		
Jul 2013	MS2.3 Meta Anal: a) Preliminary report on knowledge gaps and demand for instruments reported to WPs 3 + 4, gaps, b) work of existing exemplars, c) results on gaps	Identification of regional issues by experts completed
Aug 2013		
Sept 2013	MS2.4 Discuss Draft Blueprint	First stakeholder workshop and water resources working group
Oct 2013		
Nov 2013	MS2.5 Each Exemplar reports with Blueprint Protocol 1.0 and MS2.6 Each Exemplar submits draft study design	
Dec 2013	Exemplar implementation begins.	Land allocation working group
Jan 2014		Mountain rural areas working group
Feb 2014	**D2.1 Each Exemplar submits Study Design Description**	
Mar 2014		Second stakeholder workshop
Apr 2014		Scenarios first draft completed
May 2014		
May 2014	MS2.9 Each Exemplar reports with Blueprint Protocol 2.0	
Jun		
Jul		
Aug		
Sep		Scenario land use projections completed
Oct		Third stakeholder workshop
Nov		
Dec		
Jan 2015		
Feb		
Mar		
Apr		
May		Ecosystem service projections completed
Jun	MS2.11 Exemplars Interim Report	Fourth stakeholder workshop
Jul		
Aug		
Sep	MS2.13 Each Exemplar reports with Blueprint Protocol 3.0	
Oct		
Nov		
Dec		
Jan 2016	MS2.14 Evaluation of processes in each exemplar with potential	Fifth stakeholder workshop

	adaptation to the work plan	
Feb		
Mar	MS2.16 Decision tree workshops in collaboration w/ Meta-analysis and Exemplars	
Apr		
May		
Jun		
Jul		
Sep		
Oct	MS2.17 Each Exemplar reports with Blueprint Protocol 4.0	
Nov		
Dec		
Jan 2017	MS2.18 Contributions to the Resource Hub	
Jan 2017	MS2.19 Final OPERAs Exemplar Conference	
Feb	**D2.3: Compilation of reporting of all exemplars for further evaluation and synthesis**	

Work Package 2: Practice
Task 2.2 Exemplars
Milestone 2.6 Draft exemplars study design

Draft Exemplars Study Design: Global Exemplar

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Anita Bayer, Karlsruhe Institute of Technology
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November 2013

1. Dream Abstract

International policy directives such as the Convention on Biological Diversity (CBD) or the Framework Convention on Climate Change (UNFCCC), and the need to feed an increasing global population strongly compete for land around the globe. The Global Exemplar addresses these issues using a multi-scale approach from the regional to the global scale. It aims to create a better understanding of the impacts of major global policy directives and pressures on ecosystem services and natural capital from regional case studies to the global scale.

Large-scale and low resolution land use and ecosystem modelling by a range of models will help to estimate the impacts of global pressures over large areas around the globe on multiple ecosystem services (ES). Thereby, ES will be derived by post-processing from simulation results. Small scale and high resolution studies, e.g. in Peru, will provide insights on strongly contextualized impacts of the same global pressures and how they are expressed within single regions. Both the development of changes in the past, as well as potential future changes of ES provision within the context of given scenarios, will be identified. The timeframe is going back 20 years, reconstructing the current situation, and then projecting into the future until 2030 with regional models and for the global models until 2050.

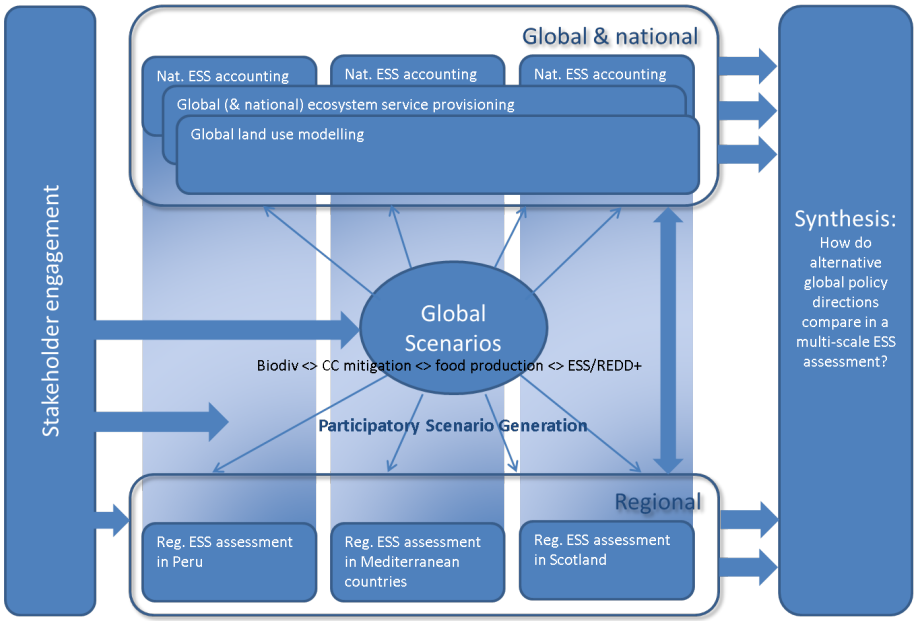
The combination of multiple models and easily usable methods for ES estimation which will be developed will enable the identification of key drivers of ES transitions, of synergies and trade-offs between different political decisions and services, as well as the identification of vulnerable areas and most critical services. Ideally we would be able to inform the climate change as well as the biodiversity conservation communities about potential conflicts and jeopardizing goals. Both political communities would be able to make better decisions based on this information.

2. Study Rationale

The Global Exemplar uses scenario analysis as a tool to assess potential impacts of major global policy directions across scales. Global scenarios will inform simulations at the global and national scales, and will set the boundary conditions for the regional scale assessments, with the elaboration of regional scenarios in line with these boundary conditions being a first step (see Figure 1). These global scenarios include strong policy steering towards a) biodiversity conservation, b) climate change mitigation, c) food production and d) combined approaches towards biodiversity, climate mitigation and

secure livelihoods through REDD+-like global policy initiatives. While large-scale / low resolution land use and ecosystem modeling will help to estimate the impacts of global pressures over large areas around the globe on selected ecosystem services, small-scale / high resolution studies will provide insights on strongly contextualized impacts of the same global pressures and how they are expressed within single regions.

At this stage one regional case study is definitely planned and located in Peru. Integration of further case studies from the Mediterranean and Scottish exemplars might be possible.



An assessment of various ES on the national level (based on information from the global models) will serve as the bridge from global to regional scales. This would bring in an intermediate level of aggregation and could informally link to the work within the regional case studies. Large-scale / low resolution studies will partly inform the research at the regional scale throughout the course of the project.

A common general procedure, a common set of ecosystem services and common global scenarios build the backbone of the Global Exemplar. The common procedure includes the reconstruction of ecosystem service provision and use for past decades and the further development of ecosystems in the coming decades under predefined scenarios. A common set of ecosystem services will be investigated in all parts of the Global Exemplar, although this is only a subset of ecosystems services addressed in single parts. The common set of global scenarios will represent combinations of the most important global policy directives of relevance for land use patterns worldwide. Despite the differences in

scale and context, these three commonalities will help to bring together results across scales and regions (see Figure 2 for an idealized version of the anticipated output).

Figure 1. Conceptual framework of the Global Exemplar.

3. Exemplar Selection and Description

Three global models will be combined: the land system model CLUMondo which allows us to simulate likely patterns of land use change with respect to key policy scenarios, and the two highly climate sensitive ecosystem models LPJmL and LPJ-GUESS, which both allow complementary deduction of selected ecosystem services based on the CLUMondo output. The output of the land use simulations will be adapted to the requirements of the two ecosystem models (LPJmL & LPJ-GUESS) in a pre-processing procedure.

The scenarios to be investigated combine two of the major policy directions affecting global ecosystems and their provisioning of ecosystems, namely biodiversity conservation and climate change mitigation, with one of the principle pressures on the land, namely increasing demand for food. For instance, two variants for realizing the given aims/needs could be defined for each of the three factors, and then combined in a set of about 4-5 scenarios (Table 1). Many (global policy) scenarios have been developed addressing these topics over the past decade (including OECD Environmental Outlook; IPCC AR5 http://luh.umd.edu/data.php , and MEA among others). Hence, we will build on existing scenarios as much as possible. Also within the OpenNESS project, global scenarios are to be developed which will then be used as an input to the GLOBIO model, for instance.

Table 1. The three main factors to be included into the scenario analysis with two potential development pathways for each

Factors	Demand for food=constant	Biodiversity Conservation	CCM: 550 ppm by 2100
Variant 1	Agroindustry	Offset: for each unit of area converted to agriculture some forest is to be protected/ allocation linked to the	With bio-energy use

		IBAT areas	
Variant 2	Mixed farming systems	Offset-Restoration: for each unit of area converted to agriculture some natural ecosystems will be restored/allocation linked to the IBAT areas	Without bio-energy use

Changes in land use over time until 2050 will then be fed into the ecosystem models to simulate ecosystem functioning as controlled by land use change and climate change. In a post-processing procedure, the output of these models will be used to deduce the provision of multiple ecosystem services and their change over time.

Inspired by the forest transition theory, development of ecosystem services over time will be a focus of the Global Exemplar´s overarching analytical concept. Here both the development of changes in the past, as well as potential future changes within the context of the given scenarios, will be identified (Figure 2). The timeframe envisaged at this stage for the regional scale is going back between 20 and 30 years, reconstructing the current situation, and then projecting into the future until 2030. The models can be extended to longer time frames, e.g., simulate until 2050. While the large- scale models will simulate the future development of ecosystem provisioning, quantitative and qualitative methods will be combined within the regional scale case studies, e.g., in Peru.

We are planning to work in two to three small-scale, high resolution case studies along a wealth gradient, including a regional case study in Peru, Mediterranean countries and Scotland, with the case study in Peru being certain and best elaborated at this stage. Peru presents very dynamic economic, political and environmental trends, including decentralization, development of extractive sectors, and participation in global conservation and climate change mitigation agreements. It hosts ecosystems of high biodiversity value, large protected areas, ever-changing landscape mosaics with dynamic ecosystem transitions, and many indigenous communities and cultures. The drivers of

change are diverse, and originate from the global to the local level. Peru is one of the countries with the largest extent of tropical forests in the world (approx. 68 million ha), but it simultaneously experiences rapid and extensive deforestation. Vulnerability to diseases, weather disasters, habitat loss and economic stress related to climate change is high in Peru. Mechanisms such as Ecosystem-based Adaptation (EBA) to support poverty alleviation, sustainable development, biodiversity conservation and climate change adaptation have a high potential in Peru's ecosystems, though their application in synergy remains under-explored.

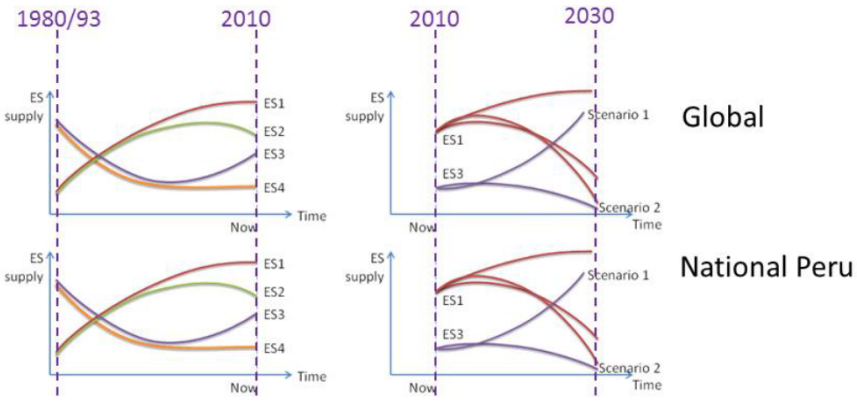


Figure 2. Ecosystem Services Transition. Analyzing past changes and developing future scenarios based on a common set of ecosystem services.

The common set of Ecosystem Services across scales is a subset of the ecosystem services addressed in the individual studies contributing to the Global Exemplar (Table 2). Three regulatory services (climate regulation, water regulation and ecosystem integrity) and three provisioning services (food, timber and firewood production) will, hopefully, be addressed throughout in each of the contributing studies.

4. Research Questions

Key research questions of the Global Exemplar include:

- How do alternative global policy directions compare in a multi-scale ES assessment?
- Where and under which conditions can we find synergistic effects, i.e. increase of multiple ES, between policy directions? Where are hotspots of vulnerability of ecosystem services?

- What do we miss when investigating ES/NC at the global scale versus the regional scale?
- How can regional studies be used to inform global decision making (e.g. related to CBD commitments, or science-policy processes such as IPBES)?
- How can we downscale global information to regional scale scenarios?
- How do global players (international conservation and development NGOs, multinational corporations, large multilateral and bilateral donors, etc.), with global policies, influence global and regional biodiversity and ES/NC?

Questions related to the past and present:

- How has ES supply changed in the past in selected landscapes?
- What have been the drivers at different scales of these changes (e.g., global markets or national policies, particularly in relation with the demand for ES such as food or regulating services)?
- How have these changes affected stakeholders at different scales, from regional to global (e.g. global population benefiting or not from carbon sequestration and climate change mitigation, regional population benefiting or not from hydrological services, local population benefiting or not from provisioning services).
- Who have been the winners and losers at different temporal and spatial scales (e.g. any trade-offs between mitigation and adaptation goals, or between upstream and downstream communities)?
- What are/have been the effects on different ecosystems and their ability to continue to provide critical services, as well as the effects on biodiversity?

Questions related to the future:

- How could ES evolve in the future under different policy, socioeconomic and climatic scenarios?
- What would be the implications of these future evolutions for ES beneficiaries at different scales?
- What interventions can improve the delivery of multiple ES with multiple benefits for biodiversity, climate change adaptation, and climate change mitigation?

5. Exemplar Goals

- understand impacts of major global policy directions and pressures on ecosystem services and natural capital using coupled land use and ecosystem models
- develop methods for calculation of ES and ES indices based on model outputs

- identification of key drivers of land use transitions and ES transitions in a multi-scale ecosystem service scenario assessment

6. Linking Stakeholders, Instruments, and Ecosystem Services

1. Stakeholder description

We will involve stakeholders from global to regional level in this exemplar. Stakeholder analyses for the large scale approach as well as for the two regional case studies will help us to identify the relevant types of stakeholders for the questions addressed. For the large scale approach, important stakeholders will certainly include the Convention of Biodiversity (CBD), the Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES) and the Biodiversity Observation Network of the Group on Earth Observation (GEO BON). Claire Brown from UNEP WCMC has confirmed to play a central role in linking our activities to these ongoing processes. She agrees upon a two-fold communication path, addressing first the design of our study and the scenarios to be targeted, and then in a later stage presenting the results of our research back to these international bodies, either through flyers (IPBES & COP) or a 2h-side event (COP). The regional stakeholders need to be identified after the definition of the specific case study regions.

2. Identification of stakeholder needs

Key issues stakeholders will address are the identification of key drivers for loss of ES and biodiversity as well as the identification of key drivers for global land use change to evaluate what would be the most relevant global land use change scenarios. Therefore, tools are needed that decision makers can use to analyze synergies and trade-offs between biodiversity, climate change adaptation, and climate change mitigation in ecosystem management projects. More tools are needed for economic valuation of adaptation services and for valuation under different future scenarios (e.g., valuation of hydrological services under scenarios of increasing vulnerability to water problems). Useful are also tools that support the design and financing of initiatives with multiple objectives and policy instruments for new ecosystem management responding to regional (CC adaptation) and global (CC mitigation) issues.

Table 2. Exemplar Plan to Address Stakeholder Needs and Improve Ecosystem Services Through Instruments.

Stakeholder Need	*Instrument to address need*	*Ecosystem Service(s) Addressed**	*Anticipated Outcome*
identification of key drivers for loss of ecosystem services and biodiversity identification of key drivers of global land use change valuation under different future scenarios analysis of synergies and trade-offs	scenario development tool land system transition modelling large scale ecosystem modelling visualization with mapping tool OE1 Ecosystem services indicator development	P1. Cultivated Crops, P3. Wild plants, P7. drinking water, P9. timber, P14. firewood, biofuels, P21. hydropower, R8. water yield, discharge, R17. soil carbon, nitrogen availability, R21. transpiration, carbon sequestration, NEP, C5/10/11: ecosystem degradation/health	multi-scale ecosystem service scenarios assessment methods to derive ES and indicators from ecosystem model outputs model coupling of land use and ecosystem models
economic valuation	CBA-IODINE2 SEEA3	" "	multi-scale ecosystem service scenarios assessment regional study on threats and opportunities
support the design and financing of initiatives with multiple objectives	TOSIA4 TESSA5	forest related for case study in Peru: P3. NTFPs, P9. timber, P14. firewood, R8. water	regional study on threats and opportunities knowledge in

policy instruments for new ecosystem management benefit analysis		regulation, R17. soil carbon, C5/10/11: suitability of ecosystems for indigenous communities and ecotourism	benefit transfer

*Following the classification of Ecosystem Services from CICES v.4.3 (January 2013), contained in the "CICES" tab of the BluePrint Protocol.

1) Our Ecosystem
2) Assessment of long-term, broad scale strategic decisions regarding different land-use options
3) System of Environmental-Economic Accounting
4) ToSIA: Tool for Sustainability Impact Assessments of ES and NC in value chains
5) TESSA: Toolkit for rapid assessment of ecosystem services at sites

7. Collaborations within OPERAs

Work Package 2: Practice

Two further regional case studies might be integrated from the Mediterranean and Scottish exemplar.

Work Package 3: Knowledge

The global exemplar combines models for simulation of land system transition with global ecosystem models. Furthermore, knowledge about links between ecosystems, biodiversity and ES functions is used for developing methods to quantify ES from these model outputs. For systematic scenario-analyses synergy and trade-off analyses will be applied. Also a monetary valuation of ES is planned.

Work Package 4: Instruments

The Scenario Development Tool will be used for secenario development and documentation. Simulated scenarios are planned to be visualized by the mapping tool OE for ease direct interaction with stakeholders. Economic valuation and simplified accounting over time series on national scales is planned using CBA-IODINE and the SEEA framework. TOSIA will be applied within the Peru case study for assessing impacts of policy changes on forest ES.

Work Packages 5 & 6: Resource Hub and Dissemination

Coupled models and new post processing programs to derive ES and indicators from model output will contribute to the resource hub. Results of the multi-scale ecosystem service assessment will be presented to international bodies by flyers, whereas PROSPEX and WCMC will support engagement of stakeholders e.g. at 2h-side events at COP and enable discussions in plenary or with single government representatives from the regional case studies like Peru.

8. Timeline

Date	Description of WP2 Milestone and Deliverables	INDIVIDUAL EXEMPLAR MILESTONES
Dec 2012		
Jan 2013		
Feb 2013		
Mar 2013		
Apr 2013		
May 2013	MS2.1 Review of exiting ES/NC assessment protocols, and MS 2.2 Draft Blue Print Protocol for systematic reporting of Exemplars and Meta Analysis	
Jun 2013		
Jul 2013	MS2.3 Meta Anal: a) Preliminary report on knowledge gaps and demand for instruments reported to WPs 3 + 4, gaps, b) work of existing exemplars, c) results on gaps	
Aug 2013		
Sept 2013	MS2.4 Discuss Draft BluePrint	
Oct 2013		
Nov 2013	MS2.5 Each Exemplar reports with Blueprint Protocol 1.0 and MS2.6 Each Exemplar submits draft study design	
Dec 2013	Exemplar implementation begins.	Definition of case study region in Peru, first translation of CLUMondo to LPJ input
Jan 2014		
Feb 2014	**D2.1 Each Exemplar submits Study Design Description**	Layout and harmonisation of regional case studies , first draft on scenarios
Mar 2014		First ES deduction from OECD scenario
Apr 2014		
May 2014		
May 2014	MS2.9 Each Exemplar reports with Blueprint Protocol 2.0	
Jun		CLUMondo Output for scenarios OPERAs meeting: pre meeting for Global Ex
Jul		stakeholder analysis + stakeholder contact
Aug		
Sep		
Oct		Ecosystem Simulations & deduction of ES
Nov		
Dec		regional case studies: past and present ES
Jan 2015		
Feb		
Mar		
Apr		
May		regional case studies: populating the threats & opportunities table
Jun	MS2.11 Exemplars Interim Report	
Jul		
Aug		
Sep	MS2.13 Each Exemplar reports with Blueprint Protocol 3.0	
Oct		

Nov		
Dec		
Jan 2016	MS2.14 Evaluation of processes in each exemplar with potential adaptation to the work plan	
Feb		
Mar	MS2.16 Decision tree workshops in collaboration w/ Meta-analysis and Exemplars	
Apr		
May		
Jun		
Jul		
Sep		timeline for past and future ES supply (large scale) and demand (local) (accounting and valuation)
Oct	MS2.17 Each Exemplar reports with Blueprint Protocol 4.0	
Nov		
Dec		submission synthesis paper
Jan 2017	MS2.18 Contributions to the Resource Hub	stakeholder contact
Jan 2017	MS2.19 Final OPERAs Exemplar Conference	
Feb	**D2.3: Compilation of reporting of all exemplars for further evaluation and synthesis**	

Work Package 2: Practice
Task 2.2 Exemplars
Milestone 2.6 Draft exemplars study design

Draft Exemplars Study Design: Lower Danube Exemplar

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November 2013

1. *Dream Abstract*

The Lower Danube is one of the last free flowing stretches of the river in Europe. Its ecosystems provide multiple benefits. The range of all these benefits is not yet fully evaluated and recognized, giving precedence to economic factors in decision-making at the expense of ecosystem and social ones.

The goal of the Lower Danube pilot is to research and demonstrate the link between Danube ecosystems and a range of environmental benefits for communities in the area as well as in the Danube river basin, given the application of appropriate set of instruments to safeguard or improve them.

The pilot will begin with a social and economic valuation of ecosystem services, which will be built upon targeted surveys and collection of social, economic and environmental data. The results of these will serve as a starting point for the development of a set of instruments enhancing the values of ecosystem services. The pilot, therefore, unfolds on several levels: local - to assess the value of wetlands for local communities and economies; regional-national - to test a decision-making support tool for the protection and management of Lower Danube ecosystems; river basin (international) - to test the applicability of the no net loss concept for finding and incorporating the real cost (loss) of nature in the cost and benefit analysis of river infrastructural projects on the Lower Danube.

The pilot also aims at raising the visibility of ecosystem services by applying an information mapping tool, TESSA.

Some of the main issues during the implementation might be the low level of awareness and understanding of ecosystem services by different stakeholders and at different levels, as well as data availability.

This Exemplar has relevance for the whole Danube river basin as it seeks to develop a set of tools for sustainable freshwater ecosystems management. By the end of this project, the Lower Danube pilot is envisaged to provide models for sustainable management and use of ecosystems and their services for the whole Danube and other river basins in Europe.

2. Study Rationale

The Lower Danube[1] pilot is the only exemplar to specifically focus on freshwater ecosystems under the OPERAs project. According to the ICPDR, some 80% of the historical floodplains in the Danube basin have been lost over the last 150 years. Among the remaining 20%, the sections of the Lower Danube between Bulgaria and Romania and in the Danube Delta are among the largest and ecologically most valuable. They play an important role in hydrological processes, in particular in flood protection, recharging of groundwater as well as for habitat and species diversity. However, these benefits are not assessed, which is diminishing their socio-economic role. Many of these wetlands are under pressure from navigation, infrastructure development and agriculture. This, in return, reflects on decision-making, dominated by economic concerns rather than integrating environmental ones.

The OPERAs project provides the opportunity to find the socio-economic value of freshwater ecosystems of the Lower Danube. It will allow for integrating these values into decision-making by developing and testing a decision-making support tool and the no net loss concept on the ground. All this will be tested using real-life data and development scenarios relevant for different stakeholders at local, national and regional level, including users and providers of ecosystem services, local institutions (environmental and governmental), river basin managers, decision makers at national level and capital providers. The Lower Danube team in collaboration with relevant project partners will work closely with all these identified groups of stakeholders to ensure the operationalization of the natural capital concept.

3. Exemplar Selection and Description

The Lower Danube, stretching from the Iron Gates between Romania and Serbia & Montenegro down to the Danube Delta and the Black Sea, and flowing for the most part along the Romanian and Bulgarian border, is one of the world's most outstanding

[1] For more information on Lower Danube conservation values, please see Annex 1

freshwater eco-regions. The Danube floodplain between the river bank and the flood protection dike has relics of oxbow lakes as well as flood channels (in parts temporarily dry) and depressions, islets (particularly the smaller islets with no human intervention), relics of wetlands and floodplain lakes in the disconnected floodplains, small water courses (particularly at the base of the terrace fed by groundwater) – all typical habitats for the Lower Danube and of particular importance from the ecological point of view, a number of them protected under the Ramsar Convention as well as the Annexes of the EU Habitats Directive.

The Lower Danube pilot, as it can be seen below, has a wide policy context. It has a relevance to the Water Framework Directive, Flood Directive, Habitats and Bird Directives, Green Infrastructure, Climate Change Adaptation. The intervention area in the Lower Danube under the OPERAs project focuses on a representative case study area - Persina Nature Park.

Fig. 1 Map of Persina Nature Park

Persina Nature Park is located in North Bulgaria, along the river valley of Danube, with a total area of 21,762.20 ha. The main purpose of designating Persina as a nature park has been to conserve and restore the wetlands near Danube River. Special attention is paid to

the numerous islands (the biggest Bulgarian and the fourth biggest in Europe Danube island), inland marshes and flooded forests. Besides a nature park, Persina is the biggest Ramsar site in Bulgaria (6898 ha) and lies within four "Natura 2000" sites. The conservation value of Persina Nature Park is formed by over 743 higher plants species, most of which are connected with the availability of water and 1,100 animal species, including 250 zoo-plankton and 99 zoo-benthos species, over 770 kinds of invertebrates with 35 snails species and 16 kinds of mussels, over 200 bird species and almost all of them of conservation statute.

Some of the main ecosystems[2] within the Nature Park are the Danube River and the wetlands connected to it, including: marshes on the Belene Island, the remnants of the former Belene and Svishtov marshes, the Osam River and the flooded areas around it, the drainage canals in the lowlands, the flooded forests (the flora of which is not rich but quite specific), and the mesophyllic high grass meadows.

Farmlands in Persina Nature Park comprise 75% of land use, while marshes and wetlands comprise 15% and 10%, respectively.

Above 60% of the land is public, owned by the state and the municipalities. State property is mainly on agricultural lands (40%) and on almost all forests (90%). Municipal ownership mainly of pastures (75%), unpaved roads (50%) and arable lands (4%). Privately owned lands are highly fragmented: the average size of lots is 1.7 ha, ranging from 0.7 ha to 2,500 ha and more than 70% of landowners have less than 1 ha. Private ownerships of more than half of the agricultural arable lands, 2/3 of orchards and gardens, 1/3 of the natural meadows.

The lands of highest conservation value are located on the islands and forests in the 200 m strip along the Danube bank. The main conservation challenges include changes in water regime after building coastal dikes leading to a disconnection of the marshes, wetland deterioration, loss of carbon sink and loss of spawning grounds.

[2] The complete list of ecosystems in Persina Nature Park can be found in Annex 2

Persina Nature Park is also representative for the Lower Danube in terms of socio-economic features. It is a typical rural area, comprised 3 municipalities with a total population of nearly 19,637 inhabitants (2011 Census, National Statistics Institute). Agriculture and fisheries are the main economic activities in the rural area. The area provides limited employment opportunities at the moment and faces the challenges of migration and ageing of population. Because of this and the unexplored potential of wetlands and their ecosystem services, freshwater ecosystems have very low recognition, if not bad reputation among locals. This is a challenge that this pilot will work on, based also on previous work of WWF in the area[3].

The relevance of the Persina Nature Park case study area extends beyond the local level - currently the remaining natural features of the river are under threat of being lost because of infrastructural development supporting energy and transport sectors. This is a potential threat not only to biodiversity but also to the society because of the loss of ecosystem services.

4. Research Questions

What are the social and economic values of wetlands?

What, if any, is the link between restored and sustainably managed wetlands and socio-economic welfare?

Optional: ecosystem impacts and benefits of improving navigation conditions through grey infrastructure measures vs. dredging

[3] WWF DCP Bulgaria has been present in the area for 10 years already, working on the restoration riparian forests on Danube islands, on management of high nature value farmlands and introduction of good agricultural practices, and on building the dialogue with fishermen and other members of local communities. Since 2011 WWF has started a pilot project on reed management as a way to restore the water regime in Kaikusha marsh (part of the case study area). The reed harvested is used by a local entrepreneur to produce and sell briquettes and pellets.

5. Exemplar Goals

The goal of the Lower Danube pilot is to research and demonstrate the link between Danube ecosystems and a range of environmental benefits for communities in the area, as well as in the Danube river basin, given the application of appropriate set of instruments to safeguard or improve them. The following objectives are set to reach the goal:

Successful demonstration of the socio-economic values of Danube wetlands, besides environmental, providing rationale to decision-makers in the Danube river basin (and local stakeholders) for prioritizing and allocation of financial and technical capacity for their restoration, sustainable management and maintenance, as well as for incorporating the losses of values in the assessment of infrastructural projects.

Raise awareness among local governmental and non-governmental stakeholders of the socio-economic opportunities of restored and sustainably managed wetland.

6. Linking Stakeholders, Instruments, and Ecosystem Services

1. Stakeholder description

The following stakeholders have been identified as relevant for this Exemplar:

- Local level - direct users and providers of ecosystem services as well as managers of the natural capital: fishermen, farmers, biomass processors of reed and agri-residuals for the production of briquettes and pellets; the Directorate of Persina Nature Park, local authorities (municipality), river basin authority (based in Pleven), citizens of the Pleven (biggest city in the exemplar location), and local media.

- National level: important stakeholders include ministries of Environment and Water, Agriculture and Foods, Economics, Finance, Bulgarian Academy of Science, national media, coalition of NGOs in Bulgaria, and the National Statistics Institute. These players are all linked through the natural capital work (ongoing process of Mapping and Assessment of Ecosystem Services at EU level). However, some of them are actively involved, such as the Ministry of

Environment and National Statistics Institute, while others are not yet a part of this process but important for the delivery of the approach on the ground, for example the Ministry of Finance.

- Regional (basin level)/ international level: this group includes users of ecosystem services, such as fishermen and farmers downstream in Romania, Bulgaria and Ukraine; users such as river transport, energy companies, and tourism businesses; and association and organisations, such as Danube strategy countries, ICPDR, UN, RAMSAR

- How were they identified?

- Local level: direct contact / interviews, pilot activities, during trainings

- National and regional: participation in working groups at ministerial / regional level, questionnaires, direct contacts

- Media: direct contact and feedback from media representatives, trainings for media

- How have they been engaged so far?

- In other projects of the WWF through capacity building events, pilot activities, demonstration of the involvement with local stakeholders at national / international specialised events (e.g. local food fests, campaigns, etc.), media trips to the pilot site (s).

2. Identification of stakeholder needs

As described previously, this Exemplar will work on several levels to address the diversity of needs of:

- improving the awareness of local communities of the value of Lower Danube ecosystem services

- improve the decision-making by developing baseline information with economic values of ecosystem services, and developing and providing a tool for the decision-making process incorporating these values showing their variability upon different development scenarios
- At the regional level, the pilot will answer the needs of the conservation communities, public capital providers and European decision-makers to assess how much natural capital is lost when going for a given infrastructural solution, showing the way to potential mitigation strategies.

Table 1. Exemplar Plan to Address Stakeholder Needs and Improve Ecosystem Services through Instruments.

Stakeholder Need	*Instrument to address need*	*Ecosystem Service(s) Addressed**	*Anticipated Outcome*
Social values of Lower Danube ecosystem and their services	Social valuation/ IVM TESSA	Regulating, Provisioning and Cultural Services	Awareness raised of the role and importance of Lower Danube Ecosystems for local communities
Economic values of Lower Danube ecosystem and their services	Economic valuation/ together with the IEEP TESSA	Regulating, Provisioning and Cultural Services	Find the economic value of ecosystem services - important for decision-makers and the process
Prioritization of funding and improving the sustainability of infrastructural projects (incl. project appraisal)	No Net Loss/ Biotope Decision Support System (mDSS) / TIAMASG	Regulating, Provisioning and Cultural Services	Provide a framework and a tool for enabling decision-making

**Following the classification of Ecosystem Services from CICES v.4.3 (January 2013), contained in the "CICES" tab of the BluePrint Protocol.*

7. Collaborations within OPERAs

A detailed description of the work on the pilot and with relevant OPERAs partners can be found in Annex 3, Logical Framework.

Work Package 3: Knowledge

Social and cultural valuation, VU- IVM, the Netherlands

Social and cultural values of pilot are evaluated from the perspective of existing and potential future users - 100 interviews are planned to be carried out in the local area. IVM will design the questionnaire, which will be conducted by WWF in the case study area.

Work Package 4: Instruments

Protected area benefits assessment, IEEP

The economic valuation will follow the protected area benefits assessment tool and process, as developed by the IEEP.

Environmental CBA, WWF DCP

Decision Support System (mDSS), TIAMASG

Develop a decision-making support tool to enable managers of the pilot to manage and prioritize ES. There will be indicators and scenario development, carried out by WWF in active dialogue and coordination with relevant stakeholders at local, regional and national level.

Work Packages 5 & 6: Resource Hub and Dissemination

Feed in information to the Resource Hub, TIAMASG

The team will also work with Prospex to ensure a representation in the Useboard.

Communication activities planned under the project to be carried out by the WWF include:

- Annual newsletters to WWF network and the environmental NGOs
- Internet site of WWF DCPO, www.panda.org/dcpo
- Communication materials explaining the instruments, and infographics
- Local and cross-border (Bulgaria-Romania) workshops
- Field trip for media representatives to Persina
- Active participation at national, Danube basin and EU level in expert working groups on ecosystem services, their assessment and mapping, and financial instruments design and application for their protection. These includes but does not limit to: Economic expert group, under the Danube River Basin Management working group of the ICPDR, Working groups at national level under the Ministries of Agriculture, of Environment and Economics, EC MAES working group

8. Timeline

Date	Description of WP2 Milestone and Deliverables	INDIVIDUAL EXEMPLAR MILESTONES
Dec 2012		
Jan 2013		
Feb 2013		
Mar 2013		
Apr 2013		
May 2013	MS2.1 Review of exiting ES/NC assessment protocols, and MS 2.2 Draft Blue Print Protocol for systematic reporting of Exemplars and Meta-Analysis	Identify key ES Identify target groups
Jun 2013		
Jul 2013	MS2.3 Meta Anal: a) Preliminary report on knowledge gaps and demand for instruments reported to WPs 3 + 4, gaps, b) work of existing exemplars, c) results on gaps	Analysis of knowledge gaps Identification of partners and instruments
Aug 2013		
Sept 2013	MS2.4 Discuss Draft BluePrint	Feedback to the discussion

Oct 2013		
Nov 2013	MS2.5 Each Exemplar reports with Blueprint Protocol 1.0 and MS2.6 Each Exemplar submits draft study design	Reports
Dec 2013	Exemplar implementation begins.	
Jan 2014		
Feb 2014	**D2.1 Each Exemplar submits Study Design Description**	Study design description submitted
Mar 2014		
Apr 2014		
May 2014		
May 2014	MS2.9 Each Exemplar reports with Blueprint Protocol 2.0	Reports
Jun		
Jul		
Aug		
Sep		
Oct		
Nov		
Dec		
Jan 2015		
Feb		
Mar		
Apr		
May		
Jun	MS2.11 Exemplars Interim Report	Report
Jul		
Aug		
Sep	MS2.13 Each Exemplar reports with Blueprint Protocol 3.0	Report
Oct		
Nov		
Dec		
Jan 2016	MS2.14 Evaluation of processes in each exemplar with potential adaptation to the work plan	Report
Feb		
Mar	MS2.16 Decision tree workshops in collaboration w/ Meta-analysis and Exemplars	Report
Apr		
May		
Jun		
Jul		
Sep		
Oct	MS2.17 Each Exemplar reports with Blueprint Protocol 4.0	Report
Nov		
Dec		
Jan 2017	MS2.18 Contributions to the Resource Hub	Information selected and provided
Jan 2017	MS2.19 Final OPERAs Exemplar Conference	
Feb	**D2.3: Compilation of reporting of all exemplars for further evaluation and synthesis**	Report

Annex 1: Environmental Value of Lower Danube

Excerpt from the Project Document of the project "Promoting Payments for Ecosystem Services (PES) and Related Sustainable Financing Schemes in the Danube Basin", funded by UNEP GEF and implemented by WWF DCPO.

The floodplains of the Lower and Middle Danube are outstanding landscapes that provide multiple ecosystem services, such as biodiversity conservation, water purification, pollution reduction, flood protection and support for socio-economic activities such as fisheries and tourism.

The Lower Danube, stretching from the Iron Gates between Romania and Serbia & Montenegro down to the Danube Delta and the Black Sea, and flowing for the most part along the Romanian and Bulgarian borders, is one of the world's most outstanding freshwater eco-regions. The Danube floodplain between the river bank and the flood protection dike has relics of oxbow lakes as well as flood channels (in parts temporarily dry) and depressions, islets (particularly the smaller islets with no human intervention), relics of wetlands and floodplain lakes in the disconnected floodplains, small water courses (particularly at the base of the terrace fed by groundwater) – all typical habitats for the Lower Danube and of particular importance from the ecological point of view, a number of them protected under the Ramsar Convention as well as the Annexes of the EU Habitats Directive. The species inventory of both terrestrial and aquatic habitats reveals an impressive number of species, many of them globally important: 55 species of aquatic macrophytes, 906 species of terrestrial plants, 502 species of insects, 10 species of amphibians, 8 species of reptiles, 56 species of fish, 160 species of birds, and 37 species of mammals.

The hydrological dynamics of the river, its erosion and sedimentation processes and periodic flooding, have determined the formation of numerous islets along the border in Romania (111 islands covering 11,063 ha) and Bulgaria (75 islets covering 10,713 ha). These islets host rich floodplain ecosystems including natural floodplain forest, sand banks, marshes and natural river channels. They are integral parts of the Danube migration corridor, essential for the distribution of many plant and animal species. The islets represent a very important feeding area for many threatened bird species: *Pelecanus crispus, Plegadis falcinellus, Nycticorax nycticorax, Ardeolla ralloides, Phalacrocorax pygmaeus, Platalea leucorodia, Phalocrocorax carbo, Egretta garzetta, Egretta alba, Aythya nyroca*. In the woods, species like *Milvus migrans, Sylvia atricapilla,*

Strix aluco, Asio otus, Caprimulgus europeus, Dryocopus martius are nesting and on the muddy banks *Alcedo athis and Riparia riparia. Haliaeetus albicilla and Falco cherrug* are also breeding in the old oaks from the islets.

From the original large floodplain area of the Lower Danube, about 72% has been cut off from the river and transformed into fish ponds or drained for agricultural use. Important functions of the floodplains have been reduced and many of what where once typical habitats no longer exist. Because of the loss of a large part of the floodplain areas, the remaining areas under influence of river dynamics (between the river banks and the flood protection dike and in particular the islets), the fish ponds and the floodplain lakes have become even more important for flora and fauna. The existing fish ponds and floodplain lakes preserve features of the former floodplain habitats and are important feeding, roosting, staging and breeding areas for many bird species. For example Pelicans (common and Dalmatian) breeding in the Danube Delta use these fish ponds to feed and rest in their migrating route.

At the mouth of the Lower Danube, the Danube Delta (80% Romania and 20% Ukraine) is the largest remaining natural wetland in Europe.4 It is an extensive fan-shaped area of river arms, lakes, reed-beds, dunes and salt marshes. Including its floodplains, watercourses and marine areas, the Danube Delta protected area adds up to 679,000 ha. The Delta includes the largest compact reed bed in the world (180,000 ha) and a complex of 30 types of ecosystems, starting with the three large river arms, floodplain forests, more than 600 natural lakes, natural and man-made channels, sand dunes and coastal biotopes. These areas form a valuable natural buffer zone, filtering out pollutants from the river, and helping to improve water quality in the vulnerable waters of the north-western Black Sea. The Danube Delta has globally important breeding, feeding and resting areas for pelicans and 300 other birds. For example it is a key habitat for 60% of the world population of Pygmy cormorant, 5% of the Palaearctic population of White pelican and 90% of the world population of Red-breasted goose.

The Delta is also an important spawning and feeding area for sturgeons, the river otter and many other endangered species. Threatened fish species listed in the IUCN red list or

in the Annexes of the Bern Convention are still present in the Danube Delta, including three species of migratory sturgeons or limnophilic species such *as Umbra kramery, Misgurnus fossilis, Carassius carassius and Tinca tinca*, which indicate the international importance of this wetland for fish. From the point of view of species richness, the Danube Delta occupies the third place in the world, after the Amazon and the Nile Delta. The international importance and significance of the Danube Delta is underlined, by its status as:

- A "World Natural Heritage Site," listed under the World Heritage Convention (since 1990);
- A Ramsar Convention wetland zone of international importance, especially as habitat for water birds (since 1990);
- A "Biosphere Reserve," listed by UNESCO (since 1990).

Annex 2: List of Persina Nature Park ecosystems in decreasing order

Source: Persina Nature Park Directorate

- The Danube River and the wetlands connected to it. These are the marshes on the Belene Island, the remnants of the former Belene and Svishtov marshes, the Osam River and the flooded areas around it, and the drainage canals in the lowlands, etc.
- The riverine flooded forests, the flora of which is not rich but quite specific.
- The alluvial deposits of the Danube with pioneer and comparatively rich riverine vegetation.
- Mesophyllic high grass meadows.
- The slightly salty riverine pastures.
- Loess dunes and alluvial strips.
- Meso to meso-xero-thermal forests and shrubs in the valleys and along the
- Danube terraces of the Nikopol Plateau.
- Xero-thermal forests and shrubs on the steep limestone hill slopes.
- Xero-thermal meadows and pastures on the hillsides.
- Limestone screes, gorges and pits with sparse but rich in specific species of grasses and shrubs.
- Limestone rock crests and walls. This group of habitats is very close to the preceding one both being a main habitat of relict and endemic plants.
- Arable land.

Annex 3. Logical framework of the Lower Danube (LD) pilot

Description		Indicators	Means of verification	Risks and assumptions
Goal	**To research and find/ prove the link between Danube ecosystems and a range of environmental benefits for communities in the area, as well as in the Danube river basin, given the application of appropriate set of instruments to safeguard or improve them.**	**Economic and social valuation of at least 1 KES The feasibility of at least 3 instruments is assessed for the pilot A set of recommendations to land use and management and funding prioritization is proposed at least 20 institutional stakeholders at national and European level, and 50% of local stakeholders are familiar with project findings.**	**Reports on valuation At least 3 instruments - documentation and supplements At least 1 set of recommendation (documents) Workshops and communications materials Internet site of WWF, partners and OPERAs project**	**A: There is no economic and social valuation of ES in the LD A: An economic and social valuation of ES by the LD is key to improving management, use and policy making A: Selected instruments address threats and will contribute to better decision-making, management and sustainable use of LD ecosystems and their services A: Results from the LD are applicable for the whole basin R: Limitation of the NC/ ES approach: Low value of ES provided by LD ecosystems because of low standard of living, which may not impact economic and policy decisions R: Limitation of the approach: relies entirely on quantitative data R: Lack of data R: Political changes leading to changes in political priorities R: Low level of understanding and uptake, as well as low capacity**
Output 1	**Social and economic values of LD pilot are evaluated from the perspective of existing and potential future users /IVM, IEEP and WWF for the economic valuation/**	**Report on socio-economic valuation PA benefit assessment tool developed for LD**	**Reports**	**A: Social and economic values are important for changing practices in and attitude to LD ecosystems and their services R: Limitation of the approach: wellbeing is the starting point for identifying KES R: Lack of data for KES**
Activity 1.1	Identify key ecosystems and their services of the LD	Report on KES	Report Correspondence	A:The identified ecosystems and their services are key for local stakeholders and representative for the LD pilot

Activity 1.2	Identify users and providers of these services	Database of local and national stakeholders Map of stakeholders and their role in the process Report on users and providers	Xls database Map of stakeholders Report	A: OPERAs partners have identified and mapped all relevant stakeholders A: Farmers, tourism entrepreneurs and fisherman, local governments are the relevant stakeholders for socio-economic valuation of LD pilot
Activity 1.3	Identify KES threats, risks and their sources	Report on threats, risks and sources of pressure	Report Correspondence with the partner	A: All non-natural threats, risks and sources of pressure to KES have been identified
Activity 1.4	Assess socio-cultural values of ES from the perspective of users and providers (workshops and interviews), providing recommendations for a positive change	Coordination meeting in Bulgaria - by 10 April 2014 Interviews with 100 respondents - April 2014 Writing paper - 3 months	Interviews report	A: A representative number of stakeholders are interviewed R: Low responsiveness of stakeholders
Activity 1.5	Identify data gaps and collect missing information for the economic valuation	Data collection - Oct-Dec 2013	Data collected	R: Not all data necessary for the economic valuation exist
Activity 1.6	Perform economic valuation of existing KES, under the existing conditions (WWF-IEEP)	PA benefit assessment tool tested	Reports	R: Not all ecosystem services can be valued
Output 2	**A set of ES/ NC tools, enabling at policy, management and decision making is developed**			
Activity 2.1.	Identify relevant stakeholders at national, river basin and EU level (if applicable)	Database of stakeholders Map of stakeholders	Database of stakeholders, xls file	A: All relevant stakeholders have been identified and mapped

Activity 2.2	Test the applicability of the NNL to the LD pilot **/Biotope France/**	1 written report on revised policies and practices Xxx of interviews with identified stakeholders 1 report on results	WWF and partners website OPERAs website Interviews and results Correspondence	A: There are infrastructural projects funded by the EIB, impacting Danube ecosystems A: There are policy gaps enabling economic development - natural capital conflicts R: Low responsiveness of identified stakeholders to information needs R: Low level of understanding of the instrument R: Low cooperation of key stakeholders R: Lack of/ limited access to information
Sub-activity 2.2.1.	Analyse relevant existing policies and practices			
Sub-activity 2.2.2.	Identification of a set of offset system under the current conditions/ situation based on the policy analysis			
Sub-activity 2.2.3.	Select EIB-funded projects impacting the Danube ecosystems to test the applicability of the offset systems			
Sub-activity 2.2.4	Summarize results from the testing (pros and cons) covering biodiversity and socio-economic aspects			

Activity 2.3	Develop a decision-making support tool to enable managers of the pilot to manage and prioritize ES, and assess trade-offs /**TIAMASG**/	A set of if-then scenarios is developed A set of relevant variables is identified A set of indicators/ proxies is identified and valued Workshop with stakeholders A DMST	Documents Correspondence Tool List of participants	A: The range of possible relevant scenarios have been captured and developed A: The KES remain the same in the future A: All relevant variables have been captured R: There might be factors which can be measured qualitatively only R: The tool might require data which do not exist at the moment R: The tool is difficult to understand
Sub-activity 2.3.1.	Develop scenarios of future development and analyse their impact on the flow of the selected KES.			
Sub-activity 2.3.2.	Define the variables that drive the impact			
Sub-activity 2.3.3.	Define indicators/ proxies to be used in the DMST			
Sub-activity 2.3.4	Development of the tool			
Sub-activity 2.3.5.	Finalisation of the tool - a workshop with stakeholders to present the tool and get feedback			
Output 3	**Communications and awareness raising in the LD pilot**			

Activity 3.1	Publish findings and results on WWF sites, partners - newsletter about the pilot	Yearly newsletter (Maya should check if it is possible to have a newsletter specially for the pilot)	4 annual newsletters in English, Bulgarian and Romanian?	R: Too technical language not understood by non-academic audience R: Challenging to communicate and "sell" tools and approaches from the comms point of view
Activity 3.3	Present the project and findings to relevant stakeholders (workshops, conferences) - incl. cross-border workshop (BG-RO)	Intro and coordination workshop - Jan 2014 2 workshops to present tools and valuation, one of which is Romania-Bulgaria workshop	List of participants, agendas, memos, pictures, presentations	R: Too technical language not understood by non-academic audience R: Challenging to communicate and "sell" tools and approaches from the comms point of view
Activity 3.4.	Publications and comms materials to visualise pilots instruments	info-graphics and materials to support and present the developed tools; a circle of Ecosystem Services by LD	Comms materials	R: Challenging to communicate and "sell" tools and approaches from the comms point of view

First meeting with project partners involved in the Lower Danube case is planned for July-Sep 2014 in Persina Nature Park

Work Package 2: Practice
Task 2.2 Exemplars
Milestone 2.6 Draft exemplars study design

Draft Exemplars Study Design: Swiss Alps Exemplar

Adrienne Grêt-Regamey, ETH Zurich
Christian Hirschi, ETH Zurich
Sibyl Brunner, ETH Zurich
Thomas Klein, ETH Zurich

November 2013

1. Dream Abstract

Mountain ecosystems are fragile and provide a range of crucial services to society. The provision of ecosystem services is strongly influenced by human actions and climate change. Existing research, however, does not bridge the spatially explicit supply of and demand for ecosystem services, often neglects cultural services and provides only sparse knowledge on how to enhance long-term sustainable development given complex collective-action problems. The primary goal of this Exemplar is to provide management and policy options that support society including policymakers and ecosystem managers to make choices required for enhancing sustainable development. Going beyond existing research, the project aims at bridging the spatially explicit supply of and demand for ecosystem services including cultural services. A backcasting approach will be applied which combines envisioned future tolerable states with the current system boundaries required to get to this shared future conditions. Thus, the project focuses on i) a better understanding of current land-use transition processes and system thresholds using an interlinked set of models, ii) integrating the spatially explicit supply of and demand for ecosystem services including cultural services under consideration of transdisciplinary knowledge and by applying 3D visualization techniques, iii) providing a set of strategies reconciling the long-term goals of sustainable development of mountain regions with often rather short-term oriented individual and collective actions.

2. Study Rationale

The study region, central Valais is a continental inner-Alpine mountain area and the driest region of the Swiss Alps. Changes in precipitation patterns are supposed to have a huge impact on vegetation. Furthermore, changes in political and socio-economic boundary conditions affect decision-making and drive rapid land-use change in the fragile mountain area. In fact, about 5% of the agricultural area of the region has been abandoned in the period between 1981 and 1993 (need reference). If observed climatic and land-use change trends continue, they will significantly affect the sustainability of ecological services with important socio-economic implications.
(new paragraph, line separation)
Mountain and subalpine forests and grasslands provide a wide range of private and public goods and services, still agricultural and forest activities are oriented towards the production of food and fibre and environmental issues have only been considered as restrictions in forest- and agri-environmental policies. Reframing natural resource use, the integrative concept of ecosystem services imposes itself as a common platform accounting for the systemic nature of the challenges ahead, for communicating the

various values of ecosystem to stakeholders and for informing decision-making processes on alternative management and policy strategies reconciling ecosystems' capacity to provide and societal demand for various services.

Many studies have investigated the underlying causal chain of global climate and socio-economic changes on ecosystem functions and their related ecosystem services. However, these studies often neglected joint consideration of supply of and demand for ecosystem services and disregarded cultural services. In contrast to existing approaches that predict changes in land-use and their related provision of ecosystem services under different climate and socio-economic scenarios, we will start the project with the identification of future demand for ecosystem services, such as XXXX. Considering the current ecological, economic, and political framework conditions sustainable pathways are designed that will ensure long-term provision of the desired ecosystem services. Past and current policy strategies have not brought the necessary modifications to mitigate negative impacts of climate or land-use change. Securing the long-term provision of mountain ecosystem services thus requires innovative institutional and organizational changes that frame an operational plan. In order to contribute to the development of local and regional strategies to manage mountain ecosystems for securing the long-term provision of their services we will thus apply a backcasting approach. By combining quantitative modeling and interactive 3D landscape visualization tools we will allow stakeholders to learn about preferable futures and trade-offs associated with their preferences based on quantitative indicators and rigorous pictures of their vision. Especially, the often overlooked cultural services might be better captured in such an integrative framework.

3. Exemplar Selection and Description

Mountains are the undervalued ecological backbone of Europe and provide essential ecosystem goods and services both to people living in the mountains and to people living outside mountains. At the same time, mountain ecosystems are especially sensitive to rapid global development. The main pressures result from changes in land-use practices, infrastructure development, unsustainable tourism, fragmentation of habitats and climate change. The case study region of Visp is a continental inner-Alpine mountain area and affected not only by changes in precipitation patterns, but also by many of the drivers of mountain land-use change mentioned above. While traditional farming systems are in decline, touristic activities and settlement development continuously grow. Thus, the exemplar is a typical example of a European mountain ecosystem in which the provision of ecosystem services is strongly influenced by climate change and human activities framed by the political system with its institutions, sectoral policies and

administrative structures. The exemplars outcomes can contribute to an improved understanding of the interlinked ecological and socio-economic dynamics in European agro-forest mountain ecosystems characterized by high touristic activities and settlement expansion and a mismatch between a high demand for cultural ecosystem services including a traditional landscape and a decreasing number of farmers cultivating land and reinforcing these services. Results furthermore will help identify principles of land-use change and management and important ecosystem properties which guide resilient land-use development for providing desired ecosystem services in mountain ecosystems.

The study area, the Visp region (see Figure 1), includes the Saas Valley (Saas Fee, Stalden), the region around Visp and the Baltschieder Valley, in total 11 municipalities. The area is 443.3 km2 wide and hosts 15'346 residents. Unproductive land accounts for 62 % of the area, while 20 % of the area is covered by forest, and about 16 % of the land is used by agriculture. Land-use change and land-use change trajectories are important issues in this region determining current land-use and given that about five per cent of the agricultural area was abandoned between 1981 and 1993. Beforehand, a large share of this land had been used as pasture. Currently, farmers in this region only cultivate less than 10 ha of agricultural land, and they house around seven livestock units. The main farming activity on all of these farms is the production of livestock based on grassland. Only seven per cent of the farms cultivate more than 0.5 ha of crops.
Analyses within the exemplar will be conducted on plot-level with an approximate resolution of 100m x 100m. Participatory assessments will include stakeholders of all relevant sectoral policy groups (agriculture, forestry, tourism, regional planning) as well as the broader population.

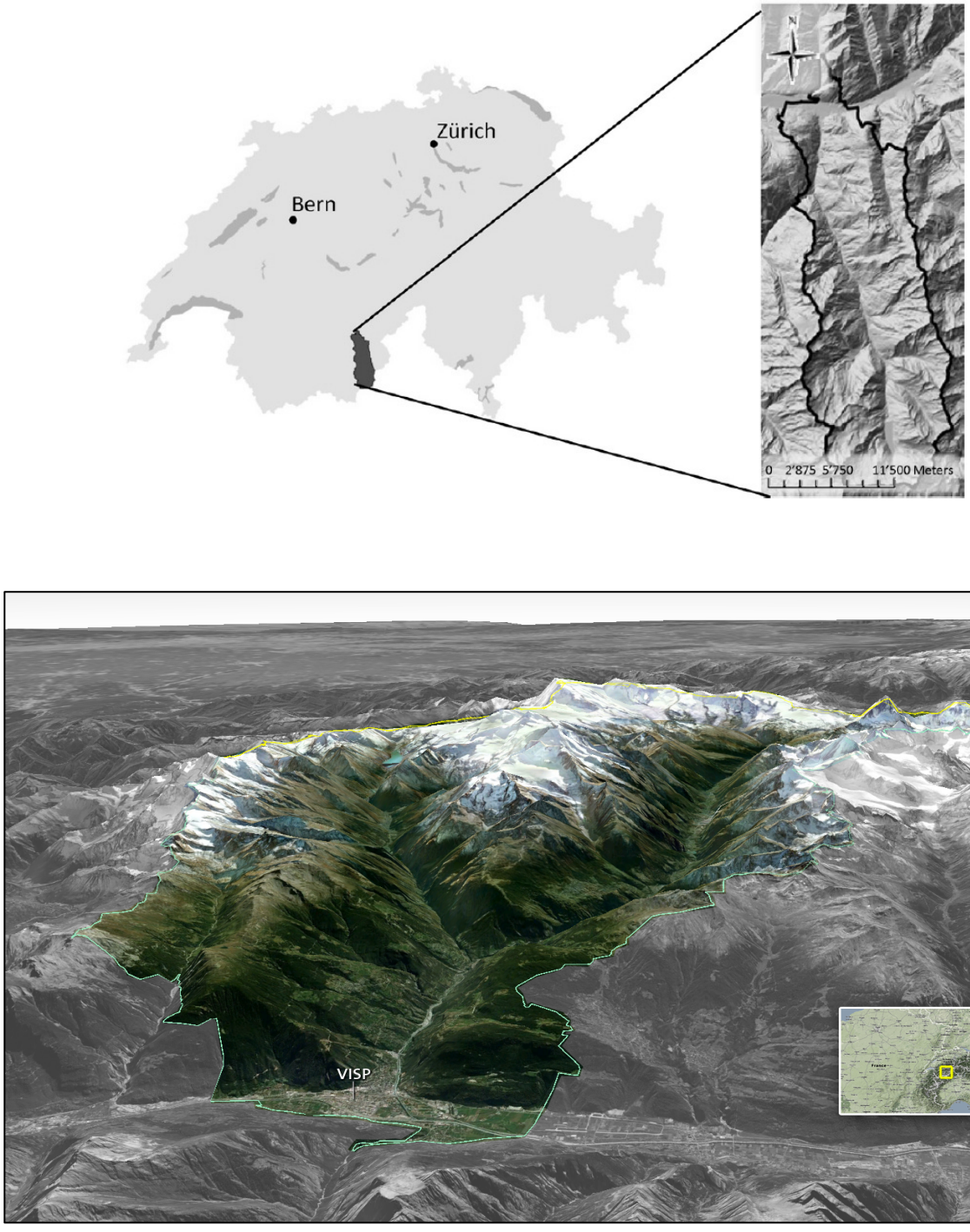

Figure 1 - The case study region: Visp in the southwest of the Swiss-Alps

4. Research Questions

- Which economic, social and political transition pathways lead towards the long-term provision of mountain ecosystem services including cultural ecosystem services?
- Which temporal socio-economic and ecological thresholds result in irreversible losses of ecosystem services with regard to a desired future?
- How can supply of and demand for the provision of mountain ecosystem services be balanced?
- What policy options do policymakers and ecosystem managers have to enhance sustainable development in mountain regions within the range of a set of tolerable future states?
- These interlinked questions will be answered by a three-step backcasting approach. The first step consists of the elaboration of a future vision in strong collaboration with stakeholders. In a second step, this knowledge will be used to define follow-up activities and develop strategies leading towards that desirable future. For this purpose the future vision is transferred to the present ecological, socio-economic and political conditions revealing fundamental boundaries in the achievement of the stakeholder's vision. Finally, the decision space given by these boundaries has to be identified for different development steps towards the vision.
- How can inter- and transdisciplinary knowledge and 3D visualisation techniques be integrated in order to define shared future states of mountain regions as starting point for backcasting land management strategies?
- For supporting stakeholders with accessible information on ecosystem services and respecting their demands, we want to provide information by various representation forms / visualization types and translate information into all scales. Further, we focus on transparency, comprehensible information, a trans- and interdisciplinary approach and the support of communication processes.

5. Exemplar Goals

As human and environmental dimension of mountain systems have become inextricably interwined, it is no longer enough to study nature's biophysical systems alone, nor is it enough to study the system components, such as the forest or the land-owner's behaviour and preferences, and land-use policies. By following a coupled human-environment perspective we aim at understanding how these components interact and how mountain regions can function more sustainably. Using such an integrative framework, the project is focusing on exploring the systemic societal, economical, and political transitions for securing the long-term provision of mountain ecosystem services.

We will develop possible future scenarios that serve as lower boundaries for future ecosystem services provision and provide management and policy options that support society including policymakers and ecosystem managers to make choices required for enhancing sustainable development. Combining model-based analysis of ecosystem services provision with transdisciplinary approaches and rigorous visualisation techniques for eliciting demand for ecosystem services, we explicitly take into account both supply of and demand for ecosystem services, as well as feedback effects between society and nature. The participatory processes can furthermore foster stakeholders' consciousness for a resilient ecosystem and anchor potential policy strategies in society.

6. Linking Stakeholders, Instruments, and Ecosystem Services

1. Stakeholder description

   Based on a comprehensive stakeholder analysis and selection procedure, we will build a stakeholder expert group with stakeholders coming from the most important administrative sectors, e.g., agriculture, forestry, energy, tourism and regional development. Furthermore, residents of the case study region willing to participate in different experiments and workshops will be part of an ongoing stakeholder process. The exemplar can build upon contacts from an existing research and stakeholder network established in previous research projects. The transdisciplinary processes will consist of two experiments and two workshops gradually improving our picture of stakeholders' future vision of the case study region: (i) an initial choice experiment to elicit preferences of residents for future levels of different ecosystem services; (ii) an online choice experiment open to the broad public to enhance sample size and test the effect of the new medium on stakeholders' choices; (iii) a workshop with selected stakeholders in which we will conduct a virtual reality choice experiment using GIS-based 3D visualisations; and (iv) a final workshop in which future scenarios are generated through a visual interface incorporating both spatial and temporal dimensions.

2. Identification of stakeholder needs

   The stakeholder dialogue is considered as a crucial integrative activity. Two inter-linked phases can be distinguished: i) the core stakeholder group reviews and reflects results, helps coordinate the stakeholder involvement and gives crucial

input to the prioritization of management and policy measures in the models; ii) in a structured transdisciplinary process with extended stakeholder groups, i.e. the broad public future tolerable states are developed. This transdisciplinary approach guarantees a high level of interaction with stakeholders in general and policymakers and ecosystem managers in particular.

Table 1. Exemplar Plan to Address Stakeholder Needs and Improve Ecosystem Services through Instruments.

Stakeholder Need	*Instrument to address need*	*Ecosystem Service(s) Addressed**	*Anticipated Outcome*
Understanding the dynamics of mountain ecosystems and ecological and socio-economic factors influencing the provision of ecosystem services	ALUAM-MCDA	Currently planned: timber harvest, agricultural food production, GHG balance, protection from natural hazards, habitat and gene pool protection, potentially enlarged to further provisioning and regulating services	
Understanding the ecological and socio-economic thresholds that result in irreversible losses of ecosystem services with regard to a desired future	ALUAM-MCDA, backcasting	Currently planned: timber harvest, agricultural food production, GHG balance, protection from natural hazards, habitat and gene pool protection, cultural services	
Communicating and informing on potential future ecosystem states	GIS-based 3D visualisation	Landscape aesthetic value, cultural services	

including visual representation of landscape			
Understanding current and future spatial trade-offs between ecosystem services	Different visualisation techniques, ALUAM-MCDA integrating plant functional traits	All above mentioned services	
(Understanding the value of ecosystem services in the case study region)	(Social valuation of ecosystem services)	(Cultural services)	

*Following the classification of Ecosystem Services from CICES v.4.3 (January 2013), contained in the "CICES" tab of the BluePrint Protocol.

7. Collaborations within OPERAs

Work Package 2: Practice

We will strongly collaborate with the French Alps exemplar by doing XXXXX, trying to establish the backcasting framework in both case study regions. Such an approach helps us identifying common principles of land-use change and management and important ecosystem properties which guide resilient land-use development for providing desired ecosystem services among European mountain ecosystems in a more general way.

Work Package 3: Knowledge

Network analysis (Christian Hirschi, ETH): New adaptation strategies and policy measures most often include revisions and extensions of well-established policy programs. To base political strategies and programs on existing knowledge and current political conditions is

often a necessary condition to enable and facilitate their implementation. However, incrementally grown policies often lack the potential to deal with unforeseen developments and abrupt changes. Therefore, long-term oriented policymaking addressing both gradual and abrupt changes due to ecological and socio-economic dynamics requires a comprehensive approach, considering both stabilizing and dynamic factors of policymaking. Since many of these political factors cannot be quantified easily, we will take a methodological approach that includes both qualitative case stu-dies and quantitative techniques using survey and secondary/process-generated data as well as network analytical tools for performing a policy network analysis within the case study region.

Social valuation of ecosystem services (Ariane Walz, University of Potsdam).

Work Package 4: Instruments

MCDA-ALUAM (Sibyl Brunner, ETH): The model aims at determining the ecosystem boundary conditions that will allow meeting the future demand for relevant ecosystem services. Once the ecosystem model is adapted to the ecological and ecosystem management conditions in the case study region, we will apply the model within the backcasting framework to explore ecological and socio-economic thresholds that result in irreversible losses of ecosystem services with regard to a desired future previously defined by a choice experiment among relevant stakeholders. Refining the model by integrating relationships between plant functional traits and ecosystem properties and services can help disentangle mechanisms behind ecosystem services trade-offs and an improved understanding of mountain dynamics.

Collaborative Web-Platform (Thomas Klein, ETH):

We will conduct a virtual reality choice experiment with the selected group of stakeholders in order to determine preferences for future tolerable states of the landscapes. Choice situations will be created emulating management decisions to allow expressing preferences for diverse landscapes and their related ecosystem services. The GIS-based 3D visualizations will help visualize and communicate the cultural ecosystem services scenic beauty and recreation. Other attributes will include the different ecosystem services quantified in the land-use model.

Combining these two instruments, we will conduct a workshop in which we generate a real-time virtual environment through a visual interface incorporating both spatial and temporal dimensions. Users will be able to move sliders such as ecological, social, and economic thresholds generating new future landscapes. Preferences will be assessed in interactive participatory processes with different stakeholder groups tracking the decision-making process.

Work Packages 5 & 6: Resource Hub and Dissemination

To be defined

8. Timeline (tentative for individual milestones)

Date	**Description of WP2 Milestone and Deliverables**	**INDIVIDUAL EXEMPLAR MILESTONES**
Dec 2012		
Jan 2013		
Feb 2013		
Mar 2013		
Apr 2013		
May 2013	MS2.1 Review of exiting ES/NC assessment protocols, and MS 2.2 Draft Blue Print Protocol for systematic reporting of Exemplars and Meta Analysis	
Jun 2013		
Jul 2013	MS2.3 Meta Anal: a) Preliminary report on knowledge gaps and demand for instruments reported to WPs 3 + 4, gaps, b) work of existing exemplars, c) results on gaps	
Aug 2013		Initial choice experiment
Sept 2013	MS2.4 Discuss Draft BluePrint	Initial choice experiment
Oct 2013		
Nov 2013	MS2.5 Each Exemplar reports with Blueprint Protocol 1.0 and MS2.6 Each Exemplar submits draft study design	
Dec 2013	Exemplar implementation begins.	
Jan 2014		
Feb 2014	**D2.1 Each Exemplar submits Study Design Description**	Online choice experiment
Mar 2014		Online choice experiment
Apr 2014		
May 2014		
May 2014	MS2.9 Each Exemplar reports with Blueprint Protocol 2.0	
Jun		
Jul		Virtual reality choice experiment workshop
Aug		
Sep		

Oct		
Nov		
Dec		
Jan 2015		
Feb		
Mar		
Apr		
May		
Jun	MS2.11 Exemplars Interim Report	
Jul		
Aug		
Sep	MS2.13 Each Exemplar reports with Blueprint Protocol 3.0	Backcasting choice experiment workshop
Oct		
Nov		
Dec		
Jan 2016	MS2.14 Evaluation of processes in each exemplar with potential adaptation to the work plan	
Feb		
Mar	MS2.16 Decision tree workshops in collaboration w/ Meta-analysis and Exemplars	
Apr		
May		
Jun		
Jul		
Sep		
Oct	MS2.17 Each Exemplar reports with Blueprint Protocol 4.0	
Nov		
Dec		
Jan 2017	MS2.18 Contributions to the Resource Hub	
Jan 2017	MS2.19 Final OPERAs Exemplar Conference	
Feb	**D2.3: Compilation of reporting of all exemplars for further evaluation and synthesis**	

Work Package 2: Practice
Task 2.2 Exemplars
Milestone 2.6 Draft exemplars study design

Draft Exemplars Study Design: Wine Exemplar

Kimberly Nicholas and Klara Winkler, Lund University
Marc Metzger and James Paterson, University of Edinburgh
Dariya Hadzhiyska, denkstatt
Marcus Lindner and Diana Tuomasjukka, EFI
Karin Viergever, Ecometrica
Lisa Ingwall-King, UNEP-WCMC

November 2013

1. Dream Abstract

Vineyards are valued landscapes especially for the provisioning and cultural services they provide in unique geographic regions. In particular, the wine industry is rapidly expanding in Southern England, where soils and climate roughly similar to Champagne allow high-quality wines to be grown. Here we describe a proposed collaboration with wine producers in the emerging region of Southern England to apply tools and instruments to address their existing business needs and priorities to achieve economic, environmental, and social sustainability, while improving ecosystem services (ES) delivery and increasing natural capital. Economic sustainability will be targeted through calculating the cost of production, as well as economic costs and benefits of undertaking sustainability activities. Existing ES indicators, as well as new ones developed for this project, will be used to identify the highest priority areas for achieving ecosystem services improvements. Improving environmental sustainability focused on better identifying productive planting sites that minimized conflict with biodiversity, and predicting vineyard yields through the Our Ecosystem tool. The industry's goal of benchmarking and reducing its carbon footprint will be addressed using two quantitative modelling tools, ToSIA and LCA. Finally, social sustainability was addressed through the use of the Scenario Toolbox to support strategic planning. Finally, cultural and aesthetic values provided by vineyards and their role in neighbour relations will be assessed using Q sorts to rank stakeholder perceptions. We have demonstrated that combining collaboration with stakeholders with cutting-edge tools and instruments has great potential to increase the delivery of ecosystem services and ultimately contribute to the sustainability of the wine sector in Southern England and beyond.

2. Study Rationale

We have chosen to focus on wine production because it offers a compelling case of tradeoffs between important ecosystem services (ES), such as provisioning (wine production), regulation and maintenance (greenhouse gas reductions, local climate regulation), and cultural (heritage, cultural, and experiential). In this Exemplar, we will operationalize ES by linking them with the existing sustainability plan of the UK Wine Association (UKVA, 2012), thereby raising the profile of the ES approach while simultaneously solving identified needs within the industry.

3. Exemplar Selection and Description

The Wine Exemplar was initially identified within the broader context of OPERAs as a case of traditional cultivated land use in the agricultural sector, strongly associated with historical cultural landscapes, spanning a geographic range across much of Europe. The case of England was subsequently identified as an exciting area of focus because it is currently undergoing rapid expansion, with vineyard areas projected to triple in the coming decade, thus providing opportunity for targeted research to have a great impact in shaping industry practices and promoting ecosystem services.

The goal is to have a comparative case design between the established region of Champagne, France, and emerging regions in the south of England. The two regions share similar climate, soils, and sparkling wine styles. However, they have different histories, which shape their cultural values, and face different challenges, with the English wine industry focusing on economic sustainability and rapid expansion, and the

Champagne region focused on production within existing vineyards and institutional regulations. Both are affected by current climate warming trends, which serve to benefit England but potentially threaten Champagne. Initial research efforts are currently focused on establishing stakeholder partnerships in England, to take advantage of access and language benefits. Subsequent analysis will determine the fate of establishing stakeholder relationships in Champagne.

4. Research Questions

- How can the concept of Ecosystem Services promote improvements in ecosystem function, delivery of services and benefits, and increase natural capital in the wine industry?

5. Exemplar Goals

- Identify the main ecosystem services of vineyards and quantify the tradeoffs between them under different management scenarios.
- Maintain and enhance vineyard ecosystem services such as wine production and carbon sequestration, while enhancing cultural services including tourism and aesthetic value.
- *Develop and test a specific process for selection of the most appropriate management practices contributing to economic sustainability and conserving resources through application of life cycle and system thinking*
- Design a stakeholder-driven participatory process to identify possible futures of the English wine industry, including challenges and opportunities, and support the strategic planning of industry response.

6. Linking Stakeholders, Instruments, and Ecosystem Services

3. Stakeholder description

Stakeholders were initially identified through desktop research on the structure of the English wine industry. This led to identifying the United Kingdom Vineyards Association (UKVA, http://www.ukva.org.uk/) as an initial target for outreach. This is a group of winegrowers and winemakers focused on sharing information, having a political voice both at the national and EU level, and developing and promoting the industry. There are seven regional associations within the UKVA (e.g., South East Vineyards Association, including areas around Surrey, Sussex, Kent, and London South, http://www.seva.uk.com/); a representative of each region sits on the UKVA Council. At the moment, we are actively working to identify the right level of stakeholders here and involve them in the project, starting with a kickoff workshop to identify stakeholder needs in January 2014 (see Timeline below).

4. Identification of stakeholder needs

Stakeholder needs to date have been identified through industry reports published by the UKVA. Subsequent follow-up with stakeholders will refine these needs to make sure they represent what our stakeholder partnerss want. To date, there have been two main reports on the wine industry status and needs in the UK with an environmental focus (although they use the framework of sustainability, rather than ecosystem services). The first is the Policy Statement on Sustainability (UKVA 2010), which identified six economic, 11 environmental, and six social program areas for the English wine industry. Economic

goals include promoting high-quality, economically viable wine production in the UK; environmental goals include carbon footprinting and management (the UK has a binding policy of 80% carbon reductions by 2050), vineyard goals including biodiversity, reduced agrochemicals, and soil management, and winery goals including water and energy efficiency and reducing wine miles; and social goals focus on workforce training and safety, responsible alcohol consumption, and good neighbor relations.

The second report, the UKVA Sustainability Project Final Report (UKVA 2012), was an extensive document (135 pages), with industry and stakeholder needs identified from surveys and interviews with industry members. The following key trends are drawn from the Executive Summary, and serve as the basis for the workplan to match OPERAs tools and instruments with stakeholder needs (Table 1). First, industry priorities rated economic sustainability highest, followed by social sustainability, with environmental sustainability receiving the lowest priority. To engage effectively with stakeholders, OPERAs instruments will need to address economic sustainability, perhaps through including life cycle costing (LCC) approaches. One urgent industry need identified in the report is the need to account for the costs of wine production, which most operations in this new industry currently cannot do; providing the tools to do so would make a substantial contribution to the ability to make better business and resource use decisions. While environmental sustainability, including ecosystem services, was ranked the lowest of the three, it is still important to the industry. Likely the most effective approach here will be through existing regulations (e.g., enabling carbon footprinting and emission reductions to align with the UK policy of reducing carbon emissions by 80% by 2050), or through promotion of existing industry goals (e.g., improving tourism and relationships with neighbors). Mapping and statistical analysis could meet the need to improve yields (which are lower than in France) and direct vineyard expansion to the most productive areas. There appears to be limited support within the industry for environmental goals for their own sake, or for focusing on certification and labeling schemes, so linking ecosystem service indicators with economic and other goals will be important, possibly through green communication. Finally, the industry currently lacks

strategic planning capacity, which could be supported by the use of the Scenario Toolbox.

Table 1. Exemplar Plan to Address Stakeholder Needs and Improve Ecosystem Services Through Instruments.

Stakeholder Need	*Instrument to address need*	*Ecosystem Service(s) Addressed**	*Anticipated Outcome*
Linking of identified industry priorities with ecosystem services, and weighting of most important priorities to achieve maximum results	ES Indicators (Lisa Ingwall-King, UNEP-WCMC)	Multiple, depending on stakeholder needs (e.g., R20. Climate regulation by reducing GHGs; C5. Heritage, cultural)	New ES as well as economic indicators that guide and monitor the improvement of ES and NC which are in line with highest-return investments for wine producers
Better yield prediction and vineyard site selection	Our Ecosystem (Karin Viergever, Ecometrica), using data layers on yields provided by stakeholders, on climate from in-	Wine production (P1. Cultivated crops)	Direct development away from biologically sensitive areas. Promote optimal variety selection and vineyard management.

	house sources, and protected areas from Lisa		
Carbon management & benchmarking	LCA (Dariya Hadzhiyska, denkstatt)	Carbon sequestration (R20. Climate regulation by reducing GHGs)	Reduced CO_2 footprint, in line with UK policy of 80% reduction by 2050; better link between industry priorities and ES by identifying product stages with greatest environmental impact
Integrate indicators and scenarios	ToSIA (Marcus Lindner & Diana Tuomasjukka, EFI)	Multiple	Compare scenarios and use data from stakeholders and project collaborators to support stakeholder decision-making
Identify threats and opportunities for plausible futures in the industry	Scenario Toolbox (James Paterson, University of Edinburgh)	Multiple	Support strategic planning by stakeholders
Improve neighbour relations and promote tourism	Q sorts (Klara Winkler, Lund University)	C7. Aesthetic, C5. Heritage, cultural	Characterize neighbour perceptions of vineyard landscapes and effectively integrate them into the working landscape

**Following the classification of Ecosystem Services from CICES v.4.3 (January 2013), contained in the "CICES" tab of the BluePrint Protocol.*

7. Collaborations within OPERAs

Work Package 2: Practice

- Kim Nicholas (Lund University)- Exemplar lead; coordinating stakeholder identification and engagement, project management, study design and implementation.
- Marc Metzger (University of Edinburgh)- Stakeholder outreach and engagement, study design and implementation.
- Collaborations with other Exemplars: potential linkages with Montado cork oak, possibility to test instruments developed in our Exemplar there.

Work Package 3: Knowledge

Still establishing contacts here.

Work Package 4: Instruments

- Marcus Lindner and Diana Tuomasjukka, EFI- ToSIA:
  ToSIA could be used as the integrating tool to present a synthesis of alternative management and value chain scenarios. We can incorporate new Ecosystem Service indicators (cooperation with Lisa), carbon footprint (LCA output; Dariya), energy and water use; pollution; recreational use; and social and economic indicators.
- Dariya Hadzhiyska, denkstatt: *Life cycle assessment*: work with stakeholders to identify their primary area of interest (e.g., biodiversity, carbon sequestration, water cycle). Further develop LCA-based tools (e.g., CFT at the farm level) for management decision

support and green communication (product labeling or information) at a regional level. Test applicability in multiple case studies with industry partners (e.g., wine and possible whiskey exemplar, Single Market for Green Products Initiative). The goal is to further bridge the gap between theoretical and practical models, and develop an instrument that is easily used by non-experts to meet producer needs.

Stakeholder engagement and communication: The overall aim is to develop a close relationship with the local stakeholders, with the idea to become part of the Community of Excellence. This will be begun through selection of key stakeholders following stakeholder mapping, followed by individual meetings with selected key stakeholders to present OPERAs partnership. Organize the first workshop for exchange of information; match stakeholder needs with OPERA goals; get to know each other; identify the key stakeholders by name – the ones who are really influential, interested and could bring a change locally. Set up a regular communication channels – emails, phone, regular meetings, etc. Develop communication strategies for different stakeholder groups (B2B, consumers), as demanded by the stakeholders.

- James Paterson, University of Edinburgh- Scenario Toolbox: The Scenario Toolbox is designed to enable stakeholders or academics to create scenarios at home or at work through a web-based platform. The toolbox will consist of two main sections: first, an online reference tool which will describe the history, use, development, etc. of scenarios and how they relate to environmental assessment; and, second, a secure long-in area which will allow stakeholders and their team members to develop qualitative storylines for a scenario. The secure area will have a step-by-step guide as well as a forum for discussion between stakeholders and scenario experts.

- Karin Viergever, Ecometrica- Our Ecosystem:
  Planning and coordination of wine exemplar Our Ecosystem app, in close collaboration with exemplar partners and stakeholders. Ideas for the app set up should be based on outcomes of stakeholder communication.

- Lisa Ingwall-King (UNEP-WCMC):
  Developing new ES Indicators tailored for the wine industry in close participation with identified stakeholders and potential collaboration with ToSIA (Diana) and cultural ES valuation (Klara).

- Klara Winkler, Lund University- Q sort: The Q Method allows the systematic study of subjectivity and helps to reveal different social perspectives on a topic. Different stakeholders do a so-called Q sort: They sort around 40 statements according to their preferences and help like this to identify the various existing viewpoints.

Work Packages 5 & 6: Resource Hub and Dissemination

- We are working to identify the appropriate stakeholder to nominate to the UserBoard, and to refine our stakeholder engagement strategy with Prospex.

8. Timeline

Date	Description of WP2 Milestone and Deliverables	INDIVIDUAL EXEMPLAR MILESTONES
Dec 2012		
Jan 2013		
Feb 2013		
Mar 2013		
Apr 2013		
May 2013	MS2.1 Review of exiting ES/NC assessment protocols, and MS 2.2 Draft Blue Print Protocol for systematic reporting of Exemplars and Meta Analysis	
Jun 2013		
Jul 2013	MS2.3 Meta Anal: a) Preliminary report on knowledge gaps and demand for instruments reported to WPs 3 + 4, gaps, b) work of existing exemplars, c) results on gaps	
Aug 2013		
Sept 2013	MS2.4 Discuss Draft BluePrint	
Oct 2013		
Nov 2013	MS2.5 Each Exemplar reports with Blueprint Protocol 1.0 and MS2.6 Each Exemplar submits draft study design	
Dec 2013	Exemplar implementation begins.	
Jan 2014		
Feb 2014	**D2.1 Each Exemplar submits Study Design Description**	
Mar 2014		

Apr 2014		
May 2014		
May 2014	MS2.9 Each Exemplar reports with Blueprint Protocol 2.0	
Jun		
Jul		
Aug		
Sep		
Oct		
Nov		
Dec		
Jan 2015		
Feb		
Mar		
Apr		
May		
Jun	MS2.11 Exemplars Interim Report	
Jul		
Aug		
Sep	MS2.13 Each Exemplar reports with Blueprint Protocol 3.0	
Oct		
Nov		
Dec		
Jan 2016	MS2.14 Evaluation of processes in each exemplar with potential adaptation to the work plan	
Feb		
Mar	MS2.16 Decision tree workshops in collaboration w/ Meta-analysis and Exemplars	
Apr		
May		
Jun		
Jul		
Sep		
Oct	MS2.17 Each Exemplar reports with Blueprint Protocol 4.0	
Nov		
Dec		
Jan 2017	MS2.18 Contributions to the Resource Hub	
Jan 2017	MS2.19 Final OPERAs Exemplar Conference	
Feb	**D2.3: Compilation of reporting of all exemplars for further evaluation and synthesis**	

8. References

United Kingdom Vineyards' Association (UKVA). (2010). Policy Statement on Sustainability, Consultation draft for Sustainability Symposium 22nd Mar 2010 (pp. 6).http://www.ukva.org.uk/images/documents/symposium_2010/ukva_sustainability_strategy_statements_mar_2010.pdf

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