OPERAs

18 Month Periodic Report

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and the Project Management Team

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Important note: the numbering of the project milestones has been updated since the DoW, as reported in the Project Implementation Plan, with the new numbering scheme outlined in Table 4 of this report.

1. Project objectives for the period

The overall objective of the OPERAs project is to improve understanding of how ecosystem services/natural capital (ES/NC) contribute to human well-being in different social-ecological systems in inland and coastal zones, in rural and urban areas, related to different ecosystems including forests and fresh water resources. The OPERAs research will establish whether, how and under what conditions the ES/NC concepts can move beyond the academic domain towards practical implementation in support of sustainable ecosystem management. This will be achieved through the following **seven specific objectives**:

O1. To **improve understanding** of how multiple drivers and existing and future ecosystem management under EU regulatory frameworks change ES/NC.

O2. To **explore, demonstrate and validate** mechanisms, instruments and best practices to maintain and enhance a sustainable flow of ecosystem services while preserving ecological value and biological diversity.

O3. To **qualify and quantify** the trade-offs and synergies between the ecosystem traits and functions associated with ES/NC and their social and economic values in Europe and globally.

O4. To **improve and modify** existing integrated decision support tools and instruments to better capture and represent the concepts of ES/NC.

O5. To **provide transparent and clear guidelines** on improved effective and cost-efficient, multi-level ES/NC governance structures and practical management measures to policymakers and stakeholders.

O6. To **develop, apply and test protocols** to generate ES/NC datasets and policy indicators that are consistent and coherent across time and space and sensitive to biophysical and socio-economic change.

O7. To **ensure the long-term perennity of key databases** and other major products of the research.

The practical implementation of these objectives is being achieved through four scientific work packages (WPs) plus WPs on management and dissemination. The objectives of each WP for the first reporting period are described below.

1.1 WP1: Project Management

Specific objectives for WP1 during the first reporting period were:

- To organise a kick-off project meeting
- To organise the Project Management Team meetings
- To organise two full project meetings (Mallorca and Lisbon)
- To manage the communication between project partners and the European Commission
- To complete and submit the first Periodic Report

1.2 WP2: Practice

Specific objectives for WP2 during the first reporting period were:

- To provide a scientific basis for the estimation of knowledge supply and gaps in ecosystem services (ES) research via a quantitative literature review
- To develop a database to share and expand data on ES case studies and projects in a comprehensible and standardized way
- To launch the Exemplar case studies, where stakeholders and OPERAs partners collaborate to identify needs to manage ecosystem services and natural capital
- To design and implement instruments and tools to meet those needs, following a study design to facilitate synergies between Exemplars
- To create and test the first iteration of the 'BluePrint Protocol', as a standardised approach for reporting and collating the methods used by each of the exemplar study sites

1.3 WP3: Knowledge

Specific objectives for WP3 during the first reporting period were:

- To evaluate existing ES/NC case studies with respect to evidence, efficiency and trade-offs
- To review and synthesise ecosystem service mapping methods
- To prepare guidelines on social cultural valuation (SCV) and valuation methods and distribute a questionnaire to relevant exemplars to explore the opportunity for SCV
- To provide a typology of governance modes of ecosystem services and natural capital based on the nature of the services
- To coordinate knowledge transfer across WP3 and to/from WP2 and WP4.

1.4 WP4: Instruments

Specific objectives for WP4 during the first reporting period were:

- To analyse the operational potential, needs and demands for ES/NC concepts in policy development and implementation
- To develop new and improved information tools that include ES/NC concepts
- To improve and further develop existing decision-support tools that include the ES/NC concept, including multi-criteria decision support tools, various types of Environmental Assessments, social cost-benefit analysis, and scenario and foresight tools
- To develop and apply new and improved implementation management and appraisal tools and instruments to support the implementation and uptake of ES/NC concepts
- To guide the development, choice and application of instruments that include ES/MC concepts both within and beyond the OPERAs project

1.5 WP5: Resource Hub

Specific objectives for WP5 during the first reporting period were:

- To start understanding user needs across a range of constituencies
- To design and develop the resource hub in collaboration with OpenNESS to meet user needs
- To start building constituencies of support for ES/NC implementation 'logics', and to contribute to capacity development amongst practitioners, academics and other user communities
- To set up processes and methodologies to ensure that the OPERAs project is conducted in close, on-going consultation with users of, and clients for, ES/NC valuation as key stakeholders
- To plan and start implementation of processes enabling deep involvement of stakeholders in selected exemplars through professional facilitation
- To plan processes enabling quality delivery and corrective action for stakeholder engagement by monitoring the involvement of stakeholders throughout the project

1.6 WP6: Outreach and dissemination

Specific objectives for WP6 during the first reporting period were:

- To develop a dissemination strategy and plan
- To develop project branding, promotional materials and the project website
- To produce short films introducing the project and explaining concepts
- To facilitate project dissemination to maximise impacts in science, policy and practice and support the constituency building to guarantee successful adoption of the Resource Hub by OPERAs stakeholders

2. Work Progress and achievements during this period

2.1 WP1: Project Management

See Section 5

2.2 WP2: Practice

2.2.1 Task Objectives

Task 2.1 – Meta-analysis

1. To set-up of a database for characteristics of ES/NC assessments based on published case-studies (T2.1.1)
2. To assess the evidence-base for methods used in ES/NC assessments (T2.1.2)
3. To develop efficiency indicators for the instruments used in ES/NC assessments (T2.1.3)
4. To conduct a meta-analysis of existing case-studies (T2.1.4)
5. To identify knowledge gap identification based on the analysis of the database (T2.1.5)

Task 2.2 – Exemplars

1. To identify stakeholder needs for different tools and instruments in each exemplar and optimise the study design (T2.2.1)
2. To report regularly and evaluate and test tools and instruments (T2.2.2)
3. Iterative learning processes between end-users, stakeholders, researchers and developers of tools and instruments (T2.2.3)
4. Final reporting and critical evaluation as a contribution to the resource hub (T2.2.4)

Task 2.3 – Practice design and synthesis

1. To elaboration of the BluePrint Protocol (T2.3.1)
2. To synthesise exemplars and extract lessons learned (T2.3.2)
3. To design of a suite of decision trees (T3.3.3)

2.2.2 Progress towards objectives

During the first reporting period the objectives of WP2 as described above and in the Description of Work have been addressed and partially already achieved. Progress made during the first reporting period is given in Table 1 in line with the work in each of the Tasks.

Table 1 Progress towards WP2 objectives

Overall objectives of WP2 as described in DoW	Achievements during first reporting period
Build a consistent database from existing ES/NC case studies with a focus on operational concepts	A consistent database from existing NS/NC case studies was constructed in Task 2.1 and used for a number of analyses as represented in MS6 (MS 2.1), MS 8 (MS2.3) and MS12 (MS2.7).
Assess the evidence-base of current ES/NC approaches and the efficiency of instruments	The above mentioned database was used to assess the evidence-base of current ES/NC approaches and the efficiency of instruments (MS12 (MS2.7))
Identify knowledge gaps and the demand for instruments	Knowledge gaps have been identified (see MS8 (MS2.3))
Provide input for the final synthesis in Task 2.1	Exemplars of different focus and scales have been established over the first reporting period. They have been consistently described (D2.1) and in close collaboration between the three WP2 tasks, a blueprint protocol is being developed (MS 7) and MS9 (MS2.4)) and improved to enable systematic reporting and enhance in-depth knowledge about the potential to operationalize the ES/NC concept. The work in the exemplars and further refinement of the blueprint protocol are continuously advised by the knowledge generated in Task 2.1/Meta-analysis to allow for best possible synthesis.
Promote a common platform (OPPLA) for developing and testing ES/NC based tools and instruments and initiate an on-going dialogue and iterative learning on stakeholder needs by facilitating collaboration and comparison between exemplars.	The Exemplars were established to develop and test ES/NC based tools in collaboration with stakeholders. This practical work has started in some Exemplars already and it about to begin in all of them soon. Work has progressed on OPPLA in collaboration with the OpenNESS project including the establishment of a User Board to define stakeholder needs (see later).
Inform the design of, and provide test beds for, methods, tools and instruments developed in Module Instruments.	In several Exemplars first stakeholder contacts have been made and appropriate tools discussed. Tool and instrument testing is on-going.
Systematically report on the process of identifying, using, and modifying the appropriate tools and instruments within each exemplar.	The Blueprint protocol will support the regular reporting from Exemplars including the adaptation of tools. Further reporting will take place regularly every 18 months.
Contribute to the Resource Hub with first-hand experiences on the use of ES/NC-based methods, tools and instruments.	Initial research has identified a number of ways in which the Exemplars can contribute to the Resource Hub. Further elaboration of these approaches is on-going.
Develop a BluePrint Protocol for the reporting of the exemplars (T2.2) and the meta-analysis (T2.1), thereby providing a systematic reporting protocol across the practice module	A first version of the BluePrint Protocol has been developed and tested by all Exemplars (MS7 (MS2.2) and MS9 (MS2.4) and MS10 (MS2.5)). First results will be analysed and discussed with Tasks 2.1 and 2.2 leading to a refined version to be developed and tested in the coming months.
Compile and synthesize lessons-learned from both the meta-analyses and the exemplars for the operationalization of tools and instruments.	All achievements of the first reporting period will support the compilation of lessons-learned across the WP2 tasks.

Task 2.1 – Meta-analysis

In order to establish an overview of currently available assessment reports the first milestone MS6 (MS2.1) **A review of existing ES/NC assessment protocols** was written and finalized on June 19, 2013.

Subtask 2.1.1. Set-up of a database: Based on the quantitative review from Seppelt et al. (2011) a Microsoft Access based repository was developed and updated with ES case studies for the period 2010 to 2013 (Lautenbach et al. 2014, MS2.3). The so called SynES (Database for Synthesis of information on Ecosystem Services) summarizes data on the methodological approaches used by the case studies as well as information on the practical implementation. This allows a synthesis of ES assessments. By designing SynES many aspects of the OPERAs blueprint protocol for the systematic reporting of the Exemplars were considered. The database is able to store spatially -explicit data related to the case studies. It is capable of dealing with socio-economic studies as well as ecological studies and covers thereby the entire thematic range of the Exemplars.

Subtask 2.1.2. Assessment of the evidence base for methods used in ES/NC assessments: The evidence-based approach, well-known and implemented in medicine, was adapted for the needs of ecosystem services science. A ‚level-of-evidence pyramid' was developed to rank study designs determining the level of evidence. Furthermore, a detailed quality checklist was developed compromising 32 questions to guide the critical appraisal of the level of evidence.

Subtask 2.1.3. Development of efficiency indicators: The work related to MS 2.7 Ranking of effectiveness of ES/NC based measures as valued in scientific literature provides an overview of the use of indicators on effectiveness and efficiency (E&E) in major ES databases. Results were discussed during the OPERAs Full Project Meeting in Lisbon, 19th -21st May 2014. Based on the feedback of the attendees and in cooperation with representatives of the Exemplars the most relevant E&E indicators will be prioritized and presented in a Report on standardized metrics/indicators for monitoring the efficiency of ES/NC based measures (Deliverable 2.2, November 2014).

Subtask 2.1.4 Conduct a meta-analysis of existing case studies: The quantitative review of ES case studies published in 2011 (Seppelt et al. 2011) was updated and extended. The dataset from Seppelt et al. (155 case studies, 1996-2010) was compared with new data (102 case studies, 2011-2013) in order to assess the knowledge gain in ES science over the previous years and the remaining gaps in order to direct future research. The results were distributed as MS2.3 Preliminary report on knowledge gaps and demand for instruments (August 2013, updated and extended 14.10.2013) and presented and discussed at the OPERAs full project meeting in Palma de Mallorca in October 2013. Updated results were discussed at a cross-WP Skype meeting (MS22 (MS3.2) Evaluation of knowledge needs emerging from the OPERAs meta-analysis and exemplars) and at the Breakout Session: Linking results from meta-analysis

to exemplar needs, OPERAs Full Project Meeting in Lisbon, 19th -21st May 2014. Additional efforts are planned to weigh the importance of indicators/questions from the meta-analysis to expectations for all Exemplars in support of their investigations.

Subtask 2.1.5 Knowledge gap identification based on the analysis of the database: Based on the quantitative review/meta-analysis knowledge gaps were identified, results distributed and discussed (cf. Subtask 2.1.4, MS8 (MS2.3) ‚preliminary report on knowledge gaps' 27. August 2013, MS22 (MS3.2) Evaluation of knowledge needs emerging from the OPERAs meta-analysis and exemplars).

Task 2.2 – Exemplars

Subtask 2.2.1 Cooperation launch, identification of stakeholder needs, and study design: Most effort within the Exemplars have so far concentrated on this task. In some cases, Exemplars were established in systems with longstanding partnerships (e.g., French Alps), where stakeholder collaborations were already underway, and work could begin quickly in identifying needs for tools and instruments. In other cases (e.g., Wine), these Exemplars represented new projects that required extensive time to identify and engage appropriate stakeholders, refining the strategy over time, sometimes in collaboration with OPERAs partner Prospex. Each Exemplar participated in the development and elaboration of a Study Design, with a draft in November 2013 (MS 2.5 First Reporting Blue Print Protocol) and a final design submitted in February 2014 as a contribution to the Study Design Description Deliverable (D 2.1).

Subtask 2.2.2 Regular reporting and evaluation of tool and instrument testing: Exemplars participated in the development and refinement of the Blueprint Protocol, including its first use in November 2013 (MS 2.5 Draft description of exemplars study design, stakeholder needs and tested tools/instruments). The most complete reporting of the tools and instruments to be used is contained in the Study Designs (D 2.1 Description of Study Design: exemplars, SH needs, tools, instruments), but Exemplars have also contributed an updated matrix of instruments used in WP4 describing their knowledge needs in reporting to WP3 (MS22 (MS3.2) Evaluation of knowledge needs emerging from the OPERAs meta-analysis and exemplars). In communication between WP4 and WP2, suitable instruments were selected for each exemplar, and the precise application and stakeholder needs in the individual exemplars were discussed.

Subtask 2.2.3 Iterative learning between stakeholders, researchers, and tool developers: OPERAs Exemplars are designed to be collaborative learning opportunities, where stakeholders can contribute to the design and development of tools and instruments to meet their management needs. The first steps of this process were undertaken through the identification of stakeholder needs in the Exemplar Study Designs (D2.1). Continued learning and refinement is taking place through the ongoing meeting and reporting within Exemplars.

Subtask 2.2.4 Final reporting, evaluation, and contribution to the Resource Hub: The groundwork for this task has already begun with the first meeting of the User Board in November 2013, where most Exemplars were represented. This is providing the foundations for the development of a Community of Excellence. Furthermore, first inputs to the Resource Hub have been identified within the group of Exemplar leads. The Exemplar leads will continue to be involved in the design of the Resource Hub, with a view to effective contributions later in the project and at the Resource Hub Conference (Task 6.1.4, Month 58).

Task 2.3 – Practice design and synthesis

Sub-task 2.3.1 Elaboration of the Blueprint Protocol: The first iteration of the Blueprint was created in collaboration with several team members from WP2 in spreadsheet format in late 2013. The spreadsheet contains several dropdown linked (macro) lists for Exemplars to choose key attributes in each of the elements they have to elaborate. The first version of the blueprint was initially designed to help the Exemplars think about their study design without requiring complex responses that were too demanding (version 2 will include a more thorough analysis). The Blueprint covers basic study design issues including system boundaries (socio-political and ecological), ecosystem services studies (using the CICES classification), role and involvement of stakeholders, collaboration with other OPERAs work packages with particular emphasis on the tools and instruments used as well as methods for dissemination.

The outputs of the contributions of the exemplars to the first blueprint have been collated into a spreadsheet for analysis with a view to refining the second version. In addition to the inputs from each exemplar, a critical analysis of the blueprint is currently being undertaken by an MSc student which will also help to refine BPv2 (early feedback and results are already helping to re-design the approach to collecting information on cultural ecosystem services from exemplars).

Version 2 of the Blueprint is being developed using Google Forms, which allows the blueprint team to create a simple online database for the exemplars to complete. The advantage of this approach over using a spreadsheet is that it allows the user to review other exemplar blueprints as well as add updates in a sequential fashion; it also enables the blueprint team to download data into easily accessible spreadsheet format. Finally, hosting the blueprint online, provides a valuable opportunity to promote and disseminate the blueprint for other research teams engaged in ES assessments. Blueprint version 2 is scheduled to be online by the end of August 2014.

2.2.3 Deviations

We were able to submit the first WP2 Deliverable as well as 7 out of the 9 Milestones due in the first reporting period according to the first Research Implementation Plan. Deviations from the first Research Implementation Plan include the further refinement of the BluePrint Protocol leading to MS 2.8 and MS2.9, which would have been due in May 2014. The main reason for the delay is an active discussion that has started recently that will strongly support the integration of recent findings from Task 2.1 into the BluePrint Protocol. MS 2.8 and MS 2.9 will profit strongly from this ongoing discussion and have therefore been postponed to September 2014 in the recent Research Implementation Plan (D1.2).

Task 2.1 – Meta-analysis

Given the importance of trade-offs/synergies between ES, an additional focus of the analysis was carried out on trade-offs between ES. For the analysis, an additional quantitative review was performed (89 case studies, 1998-Sep 2013). Results were presented at the full project meeting in Lisbon (May 2014) and will be further developed in cooperation with WP3 Knowledge.

Additional efforts were undertaken to enhance the cooperation with Exemplars. At the full project meeting in Lisbon, we used an open space session to present and discuss the input that Task 2.1 ‚Meta- analysis' can provide to the exemplars. We analyzed exemplars needs and expectations and intend to continue this in phase 2 by designing an online survey on Exemplar needs.

Additional WP cross-cutting activities build on MS22 (MS3.2). The results from the quantitative analysis/meta-analysis were discussed with WP3 task leads, and insights gained during that discussion were included in a current paper draft on knowledge gaps in ecosystem service research.

Furthermore, Task 2.1 contributed to the OPERAs WP4 Meeting in Vienna, March 6th-7th 2014, with the objective to develop a common structure for reporting on ecosystem methods and tools within OPERAs. A first draft of a decision tree based approach was created and presented at the OPERAs Full Project Meeting in Lisbon. Many potential synergies exist between the WP4 methods and tools decision tree approach and SynES, so that further progress in WP4 is closely monitored and discussed to avoid duplication of work

Task 2.2 – Exemplars

For the first reporting period, the principle goal of Task 2.2 was to establish the twelve exemplars as a focal point of empirical research in OPERAs, to engage with relevant stakeholders, to ensure integration of WP3 and WP4 activities, and finally to describe them and

streamline them through a two-step process that led to Deliverable 2.1 (based on MS 2.6). From the overall perspective of the Task, all this could be achieved within the first reporting period, but not all Exemplars have advanced at the same rate. Some Exemplars still struggle to establish meaningful engagement with stakeholders, some can still optimise the integration of WP3 and WP4 activities, and finally a single Exemplar is not yet fully established. All these deviations at the level of single Exemplars will be solved in the coming months and are not a risk to the overall OPERAs objectives, of WP2 Practice and of the Task 2.2.

A deviation from the first Research Implementation Plan concerning all Exemplars is the postponement of the second reporting based on a refined BluePrint protocol (see sections 3.2.3 and 3.2.3.3).This will lead to a change in the overall reporting schedule, but postponing the reporting to September 2014 will allow a more elaborate version of the BluePrint protocol to be applied and this will not be a risk to the overall OPERAs objectives, of WP2 Practice and of the Task 2.2. The second deviation from the DoW is the inclusion of the Swiss Alps as a twelfth Exemplar in the OPERAs portfolio. After an informal discussion at the project meeting in Mallorca, the consortium agreed to add this Exemplar where the stakeholder contacts were already well established through ETHZ and a number of tools and methods can be tested.

Task 2.3 – Practice design and synthesis

MS 2.8: Database designed to compile lessons learned across WP has been delayed for several reasons: 1) to allow the more thorough analysis of the exemplar study design to be used with BPv2; 2) to enable the input from the critical analysis of the blueprint (Lauren LaRocca UEDIN student) to be included; and, 3) to enable more input from the meta-analysis to be included. Lauren's input in this milestone, in particular, will be very helpful by completing an effective 'lessons learned' database. MS 2.8 has therefore been postponed to September 2014 in the Research Implement Plan for the second reporting period (D1.2).

Accordingly, MS 2.9: Report on Second Blue Print (2.0) revisit each 18-month reporting period providing a more thorough review of the ongoing and future study designs of the exemplars and therefore the comprehensive reporting will also be postponed to September 2014

2.2.4 Use of Resources

See Table 7 – Work Package Person Months per Partner

Note: UFZ conducted all research activities based on in house funding. All required UFZ contributions (milestones) have been achieved on time. OPERAs EU funding will be spent in later stages of the project starting 1/2015 and following

2.2.5 References used

Seppelt, R., Dormann, C. F., Eppink, F. V, Lautenbach, S., & Schmidt, S. (2011). A quantitative review of ecosystem service studies: approaches, shortcomings and the road ahead. Journal of Applied Ecology, 48(3), 630–636. Retrieved from http://onlinelibrary.wiley.com/doi/10.1111/j.1365-2664.2010.01952.x/full

2.3 WP3: Knowledge

2.3.1 Task Objectives

Task 3.1 – Ecosystem function and quantification

1. Ro provide operational means to link ecosystem function, biodiversity and ES provision (T3.1.1)
2. To apply process-based modelling frameworks to derive metrics usable in the operational ES/NC domain (T3.1.2)
3. To explore the temporal and spatial dimensions of the ES/NC concept (T3.1.3)
4. To evaluate methods and metrics to assess uncertainty in ES/NC quantification (T3.1.4)

Task 3.2 – Social and cultural values

1. To define Social and Cultural Values (SCV) and appropriate methodologies and tools (T3.2.1)
2. To assess the spatial distribution of SCV including user rights (T3.2.2)
3. To explore multi-dimensional methods for SCV including methodologies and tools (T3.2.3)
4. To co-ordinate with exemplars on SCV and relevant methodologies and tools (T3.2.4)

Task 3.3 – Market and non-market valuation

1. To provide a review of the state-of-the-art of environmental valuation techniques (T3.3.1)
2. To expand existing and/or creating new meta-analysis databases with socio-economic and biophysical data, and test and validate the improved environmental value functions in several of the exemplars (T3.3.2)
3. To providing a critical review of existing accounting techniques and ways to integrate economic ES values in accounting frameworks (T3.3.3)
4. To compare ES value estimates with existing ES payments or other incentive schemes (preferably in exemplars) and assess the effectiveness and efficiency of mixing different policy instruments (T3.3.4)

Task 3.4 – Institutional structures and governance systems

1. To provide a theoretically informed typology of governance modes of ES/NC based on the nature of the services (T3.4.1)
2. To make a more detailed investigation of the role of property rights in relation to selected ES/NC in the context of the exemplars (T3.4.2)
3. To study existing and potential policy integration examples in EU (T3.4.3)
4. To analyse cross-scale and cross-jurisdiction aspects of selected ES/NC governance (T3.4.4)

Task 3.5 – Trade-offs and synergies in ES/NC and alternative valuation perspectives

1. To coordinate knowledge transfer across WP3 and to/from WP2 and WP4 (T3.5.1)
2. To assess and enhance the operational potential of methods for assessing trade-offs and synergies in ES/NC quantification (T3.5.2)
3. To develop novel assessment methods that integrate various ES valuation methods (T3.5.3)
4. To analyse patterns of synergies/trade-offs across exemplars (T3.5.4)

2.3.2 Progress towards objectives

The work within WP3 has focussed on improving scientific knowledge and understanding of how multiple drivers and ecosystem management change ES/NC. It followed the individual task objectives, as specified above. For WP3 as a whole, development needs were identified and a strategy for first applications was set at a WP side-meeting as part of the 1st full meeting within OPERAs (MS21 (MS3.1)); progress was monitored during 02.09.2013 and 06.03.2014 teleconferences of the task leads, and revisited at a follow-up meeting at the second OPERAs full meeting (May 2014).

Task 3.1 – Ecosystem function and quantification

During the 1st reporting period, the research effort within T3.1 has focussed on collecting ideas, the coordination and planning of joint efforts and initial implementations to provide and explore quantitative measures of ES (Fig. 1). We linked joint and individual research applications with the OPERAs exemplars. The work was the basis for Deliverable 3.1 (Transferable geo-referenced metrics and GIS based quantification functions) in which ES mapping methods were reviewed and synthesized, specifically focussing on the representation of biodiversity effects.

In subtask 3.1.1, existing ES/NC case studies were evaluated with respect to evidence, efficiency and trade-offs. In a meta-analysis of these case studies, knowledge needs were identified and evaluated in MS22 (MS3.2). Remote sensing advances for the direct mapping of ES supply and the parameterisation of trait-based models of ES supply were reviewed and a

test was conducted against a field data set and trait-based models from the French Alps. This work led towards a novel understanding of bundles and trade-offs in ES supply considering ecological mechanisms of interaction among multiple ES, and those with external drivers and human intervention. A concept of climate regulation services and an operational framework was developed for their identification and quantification, and for identifying their mechanisms (e.g. for climate adaptation) across a variety of terrestrial ecosystems. In addition, work was initiated on ES tipping points as a cross-cutting theme within WP3.

With regard to marine ES, models and quantification indicators of marine ES available in the literature were reviewed. The role of coastal marine habitats for global climate change mitigation and adaptation was evaluated based on the key ES these habitats provide (most of all carbon sequestration). A particular focus was on “seagrass meadows” in the Mediterranean. A significant loss in seagrass vegetation and therefore carbon sequestration capacity in the Mediterranean since 1960 was predicted by models (e.g. Duarte et al. 2013, Mazarrasa et al. submitted, Marbà et al. submitted). Because this enhances the risk of erosion of sediment carbon deposits, this topic is under further investigation.

In T3.1.2, work was done on using process-based global vegetation models (i.e. LPJ-GUESS, LPJmL) for the quantification of selected terrestrial ES. This allows the quantification of ES on a regional to global scale based on simulated ecosystem function that evolves in direct response to changes in the environment (climate, atmospheric CO_2, human land use) over time (T3.1.3). To achieve this, the existing ecosystem model LPJmL was modified in order to account for, a) specific land use systems playing a major role in the Mediterranean region (olives, grapes etc.), and b) different intensities of management in such land use systems, notably with respect to the role land management has for water conservation. Both activities involved evaluation of the scientific literature, as well as significant modification and testing of the code of the LPJmL model, and this work will continue into the next reporting period. A first example for an improved metric useable in the ES/NC domain was presented with the quantification of the Greenhouse Gas Value of ecosystems based on LPJ-GUESS DGVM (Bayer et al., in prep.).

This metric provides a comprehensive perspective on the full implications of biological carbon sequestration and has the potential to become meaningful to policy makers since it has a unit that can be directly transferred into market values. Using different other model approaches we quantified the supply and demand of various ES within Europe and explored this in several manuscripts (e.g. Stürck et al, 2014; Schulp et al. conditionally accepted). We investigated the effects of using different time periods as well as different climate scenarios to assess trade-offs between food and fodder provision, biofuel provision, water quality regulation and water provisioning. This analysis was performed in a German watershed and was based on the soil water assessment tool (SWAT). The work links with the analysis of trade-offs in Task 3.5. Results of various achievements within these subtasks were presented at several conferences and workshops.

In T3.1.4 we did an initial assessment of the range of uncertainty in widely used quantification methods for ES in Europe based on a systematic review and comparison of ecosystem service maps at the European scale. Uncertainties were found to vary amongst ES and were caused by differences in indicator definition, level of process understanding, mapping aim, data sources and methodology. Possibilities for quantitative validation were discussed. Results have been reported in D3.1 and a manuscript submitted for publication (Schulp et al., in review).

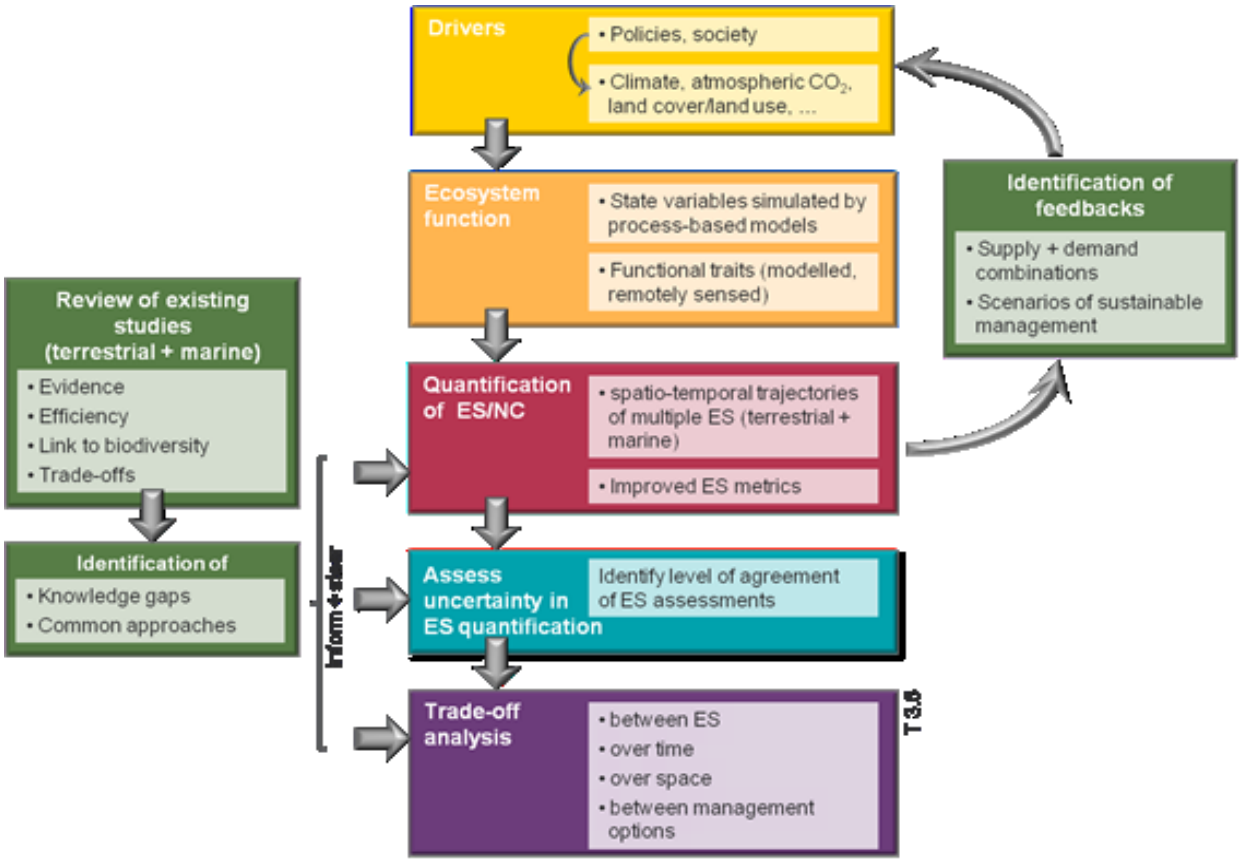

Figure 1 Workflow connecting the subtasks of Task 3.1

Task 3.2 – Social and cultural values of ES/NC

A task-specific research implementation plan was prepared in November 2013 which set out our understanding of partner obligations to the project and to the WP, as well as listing the input needed from other partners to achieve these objectives.

UCD prepared a Guidelines document on SCV and valuation methods. The first draft was circulated amongst WP3 partners and relevant exemplars in September 2013 and the final draft circulated in March 2014. The guidelines are now on the OPERAs Open Cloud site. They relate specifically to T3.2.1 and T3.2.3 and represent the initial milestone for the work-task.

For task 3.2.3 all partners have been in direct discussions with Task 3.3 using e-mail, teleconferencing and meetings on how to combine social and economic valuation methods including within the OPERAs exemplars. This process contributed to the session on values and valuation methods at the consortium meeting in Lisbon.

In T3.2.3 we contributed to a meeting in Cambridge in June 2014 (part funded by OPERAs) on how to better incorporate SCV within the TESSA decision support tool (C. Bullock (UCD) and A. Walz (UP)). In addition, UCD (C. Bullock) is the Irish representative to the IPBES expert group dealing with methodologies to incorporate SCV within biodiversity valuation.

All work task participants have a substantial input to the WP2 exemplars that will contribute to the first three task objectives and T3.2.4 specifically. UCD is responsible for the Fingal exemplar that will be examining fundamental SCV and the potential for their inclusion in municipal spatial planning. UP is combining stakeholder interviews in the Pentland Hills in Scotland with a qualitative, expert-based approach to managing for recreation. IVM is focusing on the spatial distribution of SCV relevant to work task 3.2.2 through its involvement in the Lower Danube exemplar. IVM is also managing a study in the Edinburgh peri-urban area in 2014 using photo-realistic landscape visualizations which will be followed in 2015 by work with ETH Zurich to investigate the potential of augmented reality to map SCV. All institutions have varying inputs to other WP2 exemplars employing SCV methods and with particular relevance to task 3.2.3. These include the Balearics, Inner Forth (Scotland), Montado (Portugal) and the French and Swiss Alps.

Also in T3.2.4, UCD distributed a questionnaire to relevant exemplars to explore the opportunity for social cultural valuation. From the responses, we have identified principal themes and commonalities. We began to report this feedback to the exemplars in the “free space” session on SCV at the Consortium meeting in Lisbon. We will use the responses to help identify methodologies relevant to those exemplars who have an interest in following up and to inform our deliverable on methods for socio-cultural valuation. We have discussed directly the opportunity to advise and assist on SCV for the exemplars in Scotland, Portugal, the Balearics

and French Alps. It is likely that we will contribute research directly to one of the common exemplars in Scotland.

The four exemplars which are specifically addressing SCV, are being undertaken within a PhD timeframe. As there is the possibility that the timeline required by WP2 and for a PhD could be out-of-synch with the input of WP3 to other work packages such as WP4, we have identified opportunities to bring some relevant aspects of the time-line forward and to work directly with one or two other exemplars. Progress on this activity will be closely monitored.

Task 3.3 – Market and non-market valuation of ES/NC

Most of the research effort within T3.3 has focused on D3.2, and on the coordination and planning of applications of socio-cultural and economic valuation within various exemplars.

First, although a guidance paper on economic valuation methods was planned for a later date, we shifted this forward mainly in order to inform exemplars on the possibilities for economic valuation. Specifically, two papers on economic values and on economic valuation were written (to be published as book chapters). The first chapter discusses the reasons for economic valuation of ES, the different types of economic value, and makes a link between the ecosystem service categorisation in the Millennium Ecosystem Assessment and the standard categorisation of ecosystem values as used by environmental economists. The second chapter discusses the various economic valuation methods, their characteristics, their advantages and disadvantages, and explicitly links the various ES to the available economic valuation methods. Together with a discussion paper on socio-cultural methods (MS24 (MS3.4) from T3.2), these chapters will form the basis for D3.2. Other studies and output that will feed into this deliverable are, among others:

- A discussion note on including spatial and temporal complexity in value functions (MS23 (MS3.3)). Although the note itself contains no original findings, it discusses important omissions from contemporary value transfer studies, and ways to fill these gaps. This note will serve as the basis for building the meta-analysis databases and associated papers.
- A choice experiment study on utility maximisation versus regret minimisation as decision making paradigms. Regret minimisation has been gaining ground as an alternative to utility maximisation as a decision making theory. Results of this study show that the two models perform very similar in terms of fit and predictive ability, but generate different choice probabilities and elasticities. The main reason for these differences is that the regret model accommodates a compromise-effect, and assigns relatively high choice probabilities to choice options that perform reasonably well on each choice attribute, instead of having a strong performance on some dimensions and a poor performance on others.

- A choice experiment aimed at assessing the consequences of adding a payment vehicle for the trade-offs made by people in a choice experiment. Preliminary results show that adding a payment vehicle leads to differences in preference rankings of attributes. This is likely because the payment vehicle causes people to make actual trade-offs between choice characteristics, while choice options without a payment vehicle do not contain these trade-offs, or only to a far lesser extent.
- A study on the effects of not attending to the monetary attribute on WTP and WTA value estimates in choice experiments. Preliminary results show that non-attendance to the monetary attribute is substantial in case taxes are used as a monetary attribute, thereby artificially increasing value estimates. This implies a potentially large overestimation of ES values. Moreover, non-attendance is substantially larger for tax decreases and WTA than for tax increases and WTP. This may explain to a large extent the magnitude of WTA/WTP disparities found in the stated preference literature. In conclusion, controlling for non-attendance to the monetary attribute in choice experiments substantially reduces hypothetical bias in value estimates, and decreases the WTA/WTP disparity to values that are common for real experiments. The aim is to expand the analysis to other existing databases, and to assess the robustness of the results, as well as considering payment vehicles other than tax.
- An integrated model analysis for the Scotland exemplar on changes in ES values under various policy scenarios. This study aims to contribute to the improvement of decision-making relating to the management of Scotland's natural environment. Econometric models relate the value of ES-reliant goods to natural environment, policy and economic market conditions. An integrated system links these component models to ascertain the true impacts of land use change. Optimal policies are identified as those which yield the highest net benefits from available resources subject to various constraints. Following exploratory consultation with decision-makers, a policy context is established in which a scenario is simulated wherein the Scottish Government decides to plant 5,000 hectares of new woodland per annum for each year between 2014 and 2063. Research findings indicate that a limited focus on, for instance, displaced agriculture alone can result in decisions which represent very poor value for the taxpayer. A more comprehensive assessment of the wider benefits of land use change locates new forests to maximise the net benefits in terms of both market and non-market values (e.g. from agricultural production, timber, recreation and carbon sequestration). The Central Belt is particularly well-served by this latter strategy as, for example, the inclusion of recreational benefit drives new woodlands to be planted in accessible areas near to large populations (e.g. Edinburgh and Glasgow). This initial phase of research concludes that using an integrated modelling approach to include the economic value of other non-market goods has potential to improve significantly the social value of public spending.

Second, various actions for matching the supply and demand for socio-cultural and economic valuation in selected exemplars were undertaken, among which communication through email, teleconferences and meetings. This culminated in the organisation of a valuation session at the Lisbon meeting together with T3.2, which will also serve as the base for MS21 (MS3.1)1. This session was aimed at informing project partners on the available socio-cultural and economic valuation methods, and on matchmaking between supply of (T3.2 and T3.3: Knowledge) and demand for (WP2: Practice) valuation methods and applications. Based on these actions we will develop a coordinated plan for the application of socio-cultural and monetary valuation in selected exemplars in the coming months. An important aim is to apply both socio-cultural and economic valuation methods simultaneously within several exemplars in order to assess their complementarity and arrive at more accurate ecosystem service value estimates.

Finally, work on various other tasks, milestones and deliverables has been done. With respect to D3.4 (critical review of existing accounting techniques and ways to integrate economic ES values in accounting frameworks), several papers (to be published as book chapters) have been written, and will serve as the basis for this deliverable. Several discussions between T3.3 partners, by email and teleconferences and at project meetings, have led to preliminary decisions on a structure and content. Also work on the meta-analysis databases (MS21 (MS3.1)7) has started, and several databases with spatially explicit information will become available for use and value transfer in the exemplars within the coming months.

Task 3.4 – Institutional structure and governance systems

This task provides important insights into how ecosystem services and natural capital can and should be governed. Under task 3.4 we have derived several sub-tasks for which we combine the empirical knowledge from other tasks in WP3 and other work packages within OPERAs with theoretical understanding into existing and potential governance approaches and institutional systems that support the management of ES and the maintenance of NC from which these services are derived.

To achieve our objectives, we will provide a typology of governance modes of ES/NC that is based on the nature of the services (T3.4.1). Subsequently we will conduct a more detailed investigation of the role of property rights in relation to selected ES/NC in the context of the exemplars (T3.4.2) and then study existing and potential policy integration examples in the European Union (T3.4.3). Finally we proceed to an analysis of the cross-scale and cross-jurisdiction aspects that affect the governance of selected ES/NC (T3.4.4) We have so far started our research with a comprehensive literature review on existing governance mechanisms and institutional structures that were identified for ES/NC in Europe. Moreover, we began to develop a typology of governance modes of ES/NC, which we base on the nature of the services. These can generally be divided into three broad categories – democratization, regulation and marketization. However, for each of these broad categories, many sub-categories exist or could be established. The EU at a supranational level has adopted

regulations that include governance aspects for specific ES. Some countries have also started their own regulatory approaches for ES governance, often in conjunction with the participation of civil society actors, albeit often not to a full extent. In some EU countries, for instance the UK, market approaches for the maintenance of ES/NC have become more prominent. One example is a move towards No-Net Loss and Biodiversity Offsetting schemes in the UK, or PES-schemes in Agriculture, which are found in a variety of EU countries (e.g., Germany).

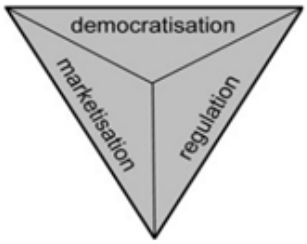

Figure 2 – Three broad categories of governance modes (sub-categories and overlaps not included in representation)

In order to link the theoretical insights of our work, we decided to cooperate with three exemplars within OPERAs. This allows us to study and test our ideas and preliminary research findings in a specific context and in collaboration with the exemplars, with the goal of establishing practically relevant knowledge that can inform future policy making. The three exemplars we have identified and with which we have started our collaboration are the Montado LTER, the French Alps and the Scottish multi-scalar exemplar. So far, we have completed Milestone 3.6 that consists of a short introduction to governance modes and why these are important to address within our task, as well as how these related to ES/NC. In order to understand governance and institutional dimensions that exist in the OPERAs exemplars, we compiled a list of generic questions in MS 3.6 that we have sent to the selected exemplars – Montado LTER, the French Alps and the Multi-scalar exemplar in Scotland. In these we formulate a set of questions that are important for our research and we are in the process of receiving feedback on these questions. The answers to these questions will form the basis for the deliverable 3.6: A portfolio of ideal types of (public and private) governance modes for selected ES/NC.

Until now we have visited one of the chosen exemplars, the Montado LTER in Portugal. There we gained first insights into the existing governance system and the existing as well as potential pressures that affect this landscape and the resulting ecosystem services, association with the different management regimes of the Montado as a particular exemplar within OPERAs. In the coming months we intend to re-visit the Montado and to conduct further visits to the French Alps (possibly in August / September 2014) and the Scottish Exemplar (Possibly December 2014). We will build on the existing Milestone 3.6 with the knowledge gained from our visits to these exemplars and ultimately use this to inform deliverable 3.6 (Due December 2016) - A portfolio of ideal types of (public and private) governance modes for selected ES/NC.

Task 3.5 –Trade-offs and synergies in ES/NC and alternative valuation perspectives

In the context of task 3.5, most effort has been put into objective 3.5.1, the coordination of knowledge transfer across WP3 and to/from WP2 and WP4. In particular, the coordination concerned work that is being conducted under the headings of tasks 3.1 to 3.4, to ensure that the various lines of work can be synthesized and compared. Methods developed under WP3 could and will be tested and illustrated in a range of exemplars (WP2). While this has the benefit that the methods are tested at scales and in contexts that are most appropriate for this purpose, it brings the challenge of comparing methods and synthesising findings towards the second half of the OPERAs project.

Therefore, it was decided in spring 2013, that all tasks in WP3 would perform part of their method development in a common exemplar, at a scale that would be acceptable to both the larger-scale approaches and the smaller-scale approaches. Moreover, data availability and language aspects were important determinants in selecting the common Exemplar. The Scottish exemplar, and in particular the national scale level, was selected as a result of these prerequisites, The various tasks of WP3 all perform part of their work in Scotland at the national scale, to allow comparison between alternative valuation perspectives and trade-off analyses (T3.5.2 – T3.5.4). To operationalize this idea, several meetings in Edinburgh were organised:

- A meeting in April 2013 (Astrid van Teeffelen (VU-IVM), Marc Metzger (UEDIN) with teleconferences to other partners) to prepare the stakeholder meeting in June 2013 and to coordinate the various lines of work in WP3 and how these can be linked to the Scottish exemplar needs.

- A stakeholder meeting in June 2013 (Marc Metzger (UEDIN), Astrid van Teeffelen (VU-IVM), Ariane Walz (UP), Katja Schmidt (UP), Craig Bullock (UCD), Deirdre Joyce (UCD), James Patterson (UEDIN) and approximately 10 Scottish stakeholders from policy, research and practice. This workshop primarily served to initiate the socio-cultural valuation work of T3.2 in Scotland, but with the clear message that this needed streamlining with other WP work to facilitate T3.5 and D3.7. In this context also potential links to the economic valuation work and biophysical quantification were made.

- ESCOM Meeting, Edinburgh, 29 April – 1 May 2014. VU-IVM (Verhagen & Van Teeffelen, see list of presentations) presented the plans on behalf of the WP3 tasks/partners, including Task1 (KIT, VU-IVM), Task2 (UP, VU-IVM) Task3 (UEA), Task4 (ULUND), Task5 (VU-IVM).

- For Dec 2014 a full WP3 meeting is planned in Edinburgh to follow up on these activities.

- WP3's plans for Scotland, together with a conceptual framework for WP3 (see Fig. 3) are captured as a milestone (MS26 (MS3.5)). A draft of this milestone was circulated in Autumn 2013, and updated using input from the ESCOM meeting and the OPERAs Lisbon meeting. It will be finalised as an intermediate product in June 2014 (VU-IVM).

To further facilitate interactions with WP2 Exemplars (as part of T3.5.1), a milestone (MS3.8, "a summary table of knowledge needs of exemplar studies") was agreed upon to extract knowledge needs from the exemplars. A draft table was prepared by UP and a final version is expected in June 2014.

To facilitate interactions with WP4 Instruments (as part of T3.5.1) a dedicated session discussing ways to strengthen knowledge exchange was held at the OPERAs full meeting in Mallorca, October 2013. To be followed up in the WP3 meeting Dec. 2014, Edinburgh.

With respect to trade-off analysis in ES/NC research, a forthcoming paper by Van Teeffelen et al. (2014) discusses the trade-offs between ecological and economic conditions for using conservation banking as an instrument to achieve no net loss of biodiversity in dynamic landscapes. The authors indicate the types of socio-ecological systems for which the instrument of conservation banking could (not) be a suitable complement to protected areas.

At the OPERAs meeting in Lisbon (May 2014) a session dedicated to trade-off analysis was held, which initiated a lively discussion on the various types of trade-offs (e.g. spatial trade-offs, temporal trade-offs, social trade-offs (winners/losers)). This marks the start of enhanced discussion and collaboration in the context of T3.5, towards deliverable D3.7, which will be a key item on the agenda of WP3's meeting in Dec 2014.

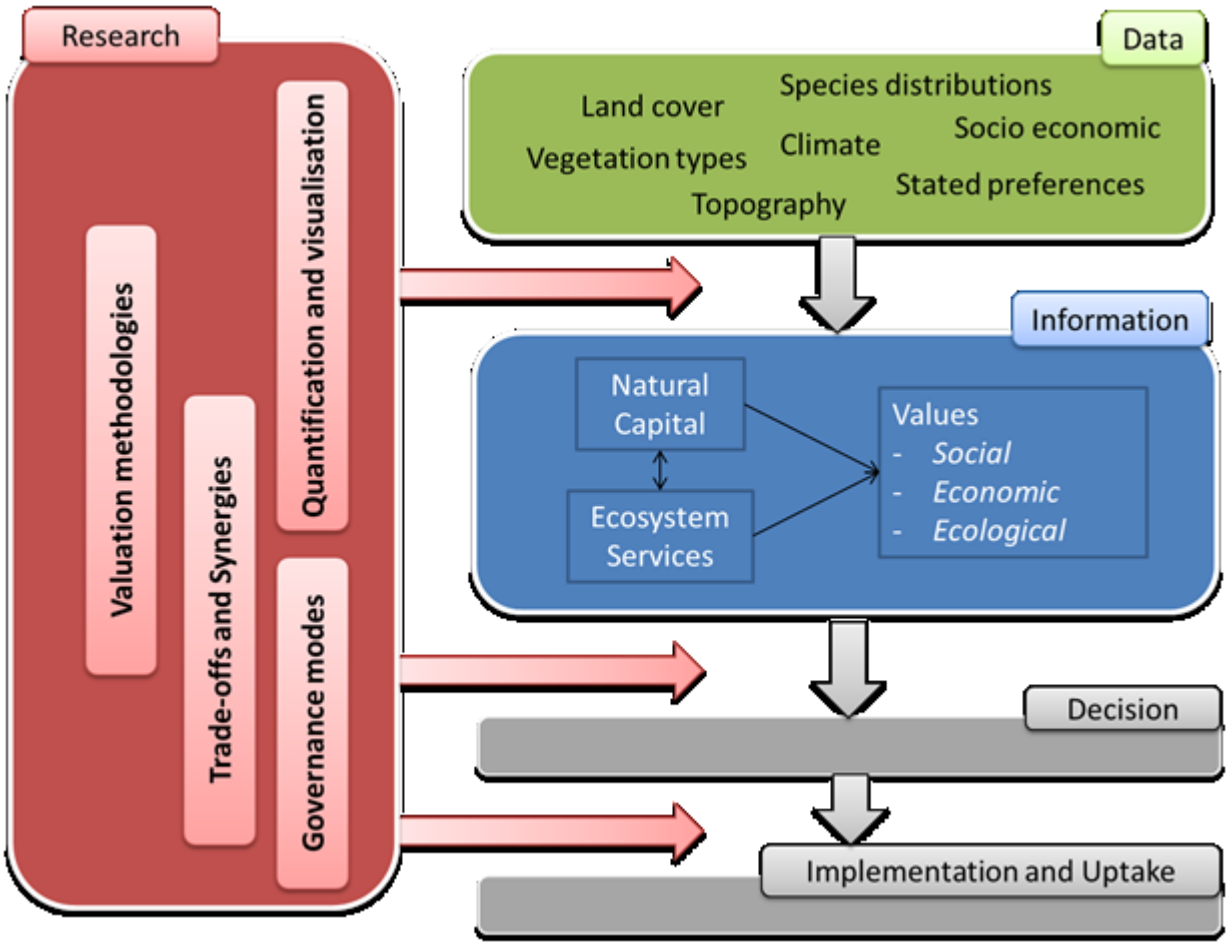

Figure 3. Research framework demonstrating the position of WP Knowledge work at different stages in the processes of operationalizing Ecosystem Services/Natural Capital.

From data, that are either available from the stakeholders, or to a certain degree collected (for socio-cultural valuation), information is derived through research. This includes values of different perspectives to the same landscape. All different perspectives are valid, but are likely to result in different outcomes of decision making processes which are assessed through research according to the main research objectives of WP3 identified above. Research outcomes can give insight and guidance to decision making processes, for example for a National Ecological Network in Scotland

2.3.3 Deviations

No significant deviations from the DOW in terms of progress towards objectives or deliverables occurred for the Tasks within WP3.

2.3.4 Use of resources

See Table 7 – Work Package Person Months per Partner

2.4 WP4: Instruments

2.4.1 Task Objectives

Task 4.1 – Demand for ES/NC instruments

1. To analyse demands and potentials from both “top-down” perspective, including policies for biodiversity conservation, sustainable use of natural resources, and environmental protection (T4.1.1)
2. To identify and assess sector-specific needs for the application and integration of ES/NC into key policy instruments and their implementation (T4.4.2)
3. To identify and assess opportunities for ES/NC integration in key emerging issues, including the green economy (T4.1.3 &T4.1.4)

Task 4.2 – ES/NC information tools

1. To develop novel data capture tools to enhance the ES/NC data pool (T4.2.1)
2. To improve existing indicator-based information tools and develop new ones with ES/NC utility (T4.2.2)
3. To improve information tools as input to accounting and ratings systems with ES/NC relevance (T4.2.3)
4. To improve ES/NC data and information storage and presentation for improved data and information exchange (T4.3.4)

Task 4.3 – ES/NC Decision Support Tools

1. To identify and systematically categorize decision-support tools and methods (within the decision-making process) allowing to explore information transfer between them (T4.3.1)
2. To develop interactive user-interfaces in improved decision support tools, such as collaborative platforms with GIS-based 3D visualizations (T4.3.2)
3. To define the necessary institutional and policy frameworks to facilitate the embedding of integrated decision-support tools into actual decision-making processes (T4.3.3)

Task 4.4 – Implementation and uptake of ES/NC concepts

1. To appraise different approaches to implementation in a range of contexts (T4.4.1)
2. To understand factors in the choice and combination of instruments and the implications of choices for cost-structures (including transaction costs), implementation impacts, and outcomes (T4.4.2)
3. To propose scheme modifications to reduce implementation costs, enhance cost effectiveness, increase transparency, overcome obstacles, avert risks, and improve policy outcomes (T4.4.3, T4.4.4, T4.4.5)

Task 4.5 – Guidance on Choice and Application of Instruments

1. To coordinate instrument development in T4.2-4, ensuring innovations meet demands specified in T4.1 and that the work is interfaced with T2.1-3 (T4.5.1)
2. To design an intuitive overview and guideline for different user groups supporting choice and implementation of problem-adapted instruments (T4.5.2)
3. to synthesize the potential for operational ES/NC instruments and develop a road map for application of different instruments and tools (T4.5.3)

2.4.2 Progress towards objectives

Tasks 4.1 to 4.4 were active during the first 18 month, with Task 4.5 working on the coordination of efforts, creating inventories (MS40 (MS4.1), MS41 (MS4.2), MS45 (MS4.6)) and targeting further development for instruments and tools (D1.2, D1.3, MS42 (MS4.3), MS43 (MS4.4), 4.7). A selection of tools and instruments was determined (MS41), and iteratively completed with targeted development ideas (MS42 (MS4.3), MS43 (MS4.4), MS46 (MS4.7)) and potentials for cooperation within – and outside – OPERAS.

A special focus was put on cooperation with the exemplars to meet user needs and demands (contribution to D2.1, MS 4.7, MS40 (MS4.1)2). Coming from a policy perspective, gaps and needs were assessed (D4.1). In the following table, green highlighted milestones or deliverables have been finalised, yellow highlighted ones (MS45 (MS4.6)) represent ongoing work, red milestone MS44 (MS4.5) has been shifted in time.

In terms of documentation, the milestones documents can be found in the OPERAsS file depository OwnCloud under WP4 milestones and deliverables separately:

- MS40 (MS4.1): D1.2 (portal)
- MS41 (MS4.2): Longlist of Instruments which are targeted for OPERAS
- MS42 (MS4.3): Shortlist of Instruments, which will be used and further developed in OPERAS
- MS42 (MS4.3): Top-down policy analysis, which is the backbone to D4.1
- MS43 (MS4.4): Factsheets for selected Instruments (accessible in a folder)
- D4.1: D4.1 and Policy brief (not yet publically available but submitted)
- MS45 (MS4.6): D1.3 (ongoing, due until end of May)
- MS46 (MS4.7): Instrument Posters which were presented to Exemplars for finding applications links (accessible in a folder)
- WP5-request: OPPLA list (ongoing) – an updated version will be added as a new milestone
- MS40 (MS4.1)2: Decision tree analysis: preparation in progress for Lisbon meeting and post month 18 work

No	Milestone name	Due	Details on progress
MS40 (MS4.1)	Module Instruments Interaction Plan ready/revisited (Task 4.5)	3	Completed, D1.2
MS41 (MS4.2)	Pre-Selection of priority instruments for further development in WP 4 (Task 4.5)	9	Completed. Long List
MS42 (MS4.3)	Means for enhancing selected ES/NC data tools and accounting and ratings systems identified	15	Completed. Short list. Plus Excel table which forms backbone of D4.1 – not 4.1
MS43 (MS4.4)	Procedures for the integration of the ES/NC into existing decision-support tools	15	Completed. Short list, factsheets
MS44 (MS4.5)MS44	Policy gaps and needs assessment interviews / surveys (MS and EU level) (Task 4.1), Interviews / surveys with stakeholders (Task 4.4)	25 -> 32	For Task 4.1: rescheduled and changed to online survey
D4.1	Report and Policy brief on existing and emerging policy needs and opportunities	16 -> 17	Completed D4.1 and Policy brief
MS45 (MS4.6)	Management milestone: Revised RIP	18	On-going D1.3
MS46 (MS4.7)	Data capture, indicator-based, and information tools selected for enhancement, development and trial	18	Completed. Short list, Posters, O-NEST list
MS40 (MS4.1)2	Trialling new and enhanced data capture, indicator-based, and information tools within Exemplars	36	On-going, decision tree analysis
D4.4	New and enhanced existing data capture, indicator-based, and information tools incl. Documentation	48	On-going

Table 2 WP4 Milestones

Task 4.1 – Demand for ES/NC instruments

Sub task 4.1.1 Top down analysis: gaps and needs assessment for the integration of ES/NC concepts: The task was carried out as a policy audit, investigating (a) the existing integration of ES and natural concepts into key EU policy areas and (b) the needs and opportunities for further integration. Policy areas covered included: environmental policies (air, soil and water), policies related to the management of natural resources (agriculture and rural development, fisheries and marine areas and forest), policies with known impacts on nature and natural resources (regional development, climate, bioenergy and transport).

In order to assess the current level of integration, two different levels of integration were identified: conceptual integration (i.e. the extent to which the concepts of capitals/NC have been recognised in the premises of a given sectoral policy as stated policy objectives and scope etc.) and operational integration (i.e. the existence of concrete policy instruments to include, the concepts such as dedicated pieces of legislation and funding instruments etc.). The level of operational integration has been assessed taking into consideration both instruments aimed at preventing harm to biodiversity and ES and instruments aimed at proactively maintaining and enhancing ES/NC.

Sub task 4.1.2 Bottom up analysis demands and needs for ES/NC instruments by key stakeholders: For the Danube exemplar, a review of the existing relevant policies and instruments regarding freshwater ecosystems started with a stakeholders mapping process in Bulgaria. A workshop to present and promote OPERAs key messages among stakeholders with a focus on freshwater ES was organized by WWF Bulgaria, supported by denkstatt as both being local partners. In the Alps exemplar, Biotope initiated a review of planning documents (urban planning and protected areas strategy). This work is closely articulated with stakeholder engagement by CNRS in the exemplar.

The top-down policy audit also covered a number of aspects related to sub-tasks 4.1.3 (emerging needs). The assessment identified and assessed a number of high level initiatives that provide an impetus for mainstreaming the concepts of ES/NC in the EU. These horizontal non-sector specific policy initiatives were identified based on a review of current EU policy developments and trends that create opportunities for the integration and uptake of ES. The audit was also closely linked to / contributed to the work carried out under WP4 Task 3.4.3 (institutional structure and governance systems - existing and potential policy integration examples in EU). The work under Task 3.4.3 focuses on assessing the current level of integration of ES/NC into policies and governance, with focus on identifying gaps in integration, exploring synergies and trade-offs between different policies and their governance. Ultimately, the results and insights of the assessment are foreseen to lead to an applicable framework / approach for assessing the level of ES/NC integration into policy frameworks at different levels of governance.

The results of the above assessment were published in a dedicated deliverable (D4.1) and with the approach and key results summarised in a policy brief. In addition, they lead to the development of a joint WP4 (draft) conceptual framework for the integration of ES/NC instruments and tools into policy sectors, being further developed in the future as a joint WP initiative.

The top-down policy audit above also covered a number of aspects related to sub-tasks 4.1.3 (emerging needs) and sub-task 4.1.4 (ES/NC in the context of specific policy tools). In the

future, the results of task 4.1.1 will be used to further identify relevant and/or promising policy areas and instruments, to be taken forward for more in-depth exploration under Tasks 4.1.2 to 4.1.4 and further under T4.2,T4.3 and T4.4. Also, it is foreseen that Task 3.4.3 will build on this analysis.

The top-down policy audit (Task 4.1.1.) also initiated work related to sub-task 4.1.4 (ES/NC in the context of specific policy tools). To explore the instruments enabling integration, a classification was developed to disaggregate the different types of EU policy instruments. Three different – but interlinked - categories of instruments were identified, based on the conceptual framework being developed in the context of OPERAs. These included: information instruments (data, indicators, monitoring, mapping, accounting, science-policy assessments), decision-support instruments (planning tools, reporting frameworks, and impact and risk assessment procedures) and implementation instruments (dedicated legislative acts/regulations/standards, protected areas, public investment, and market-based instruments and certification amongst others). In general, there is an apparent lack of information instruments for ES/NC at the EU level, including a lack of EU-level data, EU indicators for ES (general and sector specific), and common frameworks for monitoring, mapping and accounting. While some of these aspects are currently being developed (e.g. EU MAES and EEA natural capital accounting initiatives) there is an urgent need to improve the EU framework of information instruments for ES that underpin the development and implementation of all EU sectoral policies. While the existing EU decision-support and implementation instruments already provide a range of opportunities for integrating ES/NC into the policy implementation processes, further development is required to make the integration more explicit and comprehensive. Some of these instruments are discussed in more detail below.

Task 4.2 – ES/NC information tools (task lead: WCMC)

Sub task 4.2.1 Enhancement and development of innovative data capture tools: This task focuses on capturing information from stakeholders, on social values and the benefits of ES/NC, through crowd-sourcing methods. A list of instruments and tools for data capture has been identified as well as their enhancement and development potentials, e.g. for TESSA a new module to assess and evaluate cultural ES is being developed and will be trialled in the Montado and Scotland exemplars. To identify a methodological approach for this new module, an expert workshop is planned for the near future. Another approach is based on current work in the EU FP7 project VOLANTE to public visions for land use (see www.vision2040.eu). The software is adapted to set up a social valuation crowd sourcing campaign for assessing cultural ecosystem service values in several exemplars (e.g. Dunes) (T2.2) following the VOLANTE campaign (which will run until autumn 2014). Additional links will be sought with the GEO BON project that is funded under the current call. Like the VOLANTE tool, the enhancement of TESSA first focuses on developing methods of capturing socio-cultural values but with a more site based focus and less technical skills or resources needed. The second focus is the development of its user friendliness, from a 350 page pdf to a web-based resource, which will

facilitates its use greatly. For this, several meetings have taken place with feedback from previous users of TESSA.

Sub task 4.2.2 Enhancement of selected indicator-based tools and development of new indicator-based tools: Based on the analysis in T4.1, and in collaboration with both users and instrument developers within OPERAS, opportunities for strengthening existing indicator-based tools have been identified. Work on developing a conceptual framework of appropriate indicators and indices (with protocols) for characterizing and quantifying ES/NC is ongoing: Based on CICES indices and existing indicator frameworks, EFI and WCMC work on a review of suitable indicators to describe and monitor ES and NC which includes a review of the MAES report. This work has started and aims at developing a suitable indicator framework which can be used by the exemplars and in ToSIA, LCA and Tessa. A first draft of the report by WCMC is under review. In collaboration with WCMC, Tiamasg started to translate some of the TESSA concepts and methods into IT instruments. It analysed different ways to implement the TESSA methods with appropriate software and focused on smart mobile devices to be used by practitioners directly in the field. The first application was developed for the Android Operating System (OS) and is currently being tested. It will be launched in the first part of the next OPERAs phase.

First indicators were identified and defined, such as indicators of forest resources that can be interpreted from GIS and remote sensing data (EFI). Discussions are ongoing with stakeholders in the Wine, Montado and Global exemplar to identify aspects of main concern to them, which may result in the development of new indicators. WCMC is identifying an indicator for the ES pollination. Biotope has developed a first set of indicators of wetland functions and services for use by public authorities in France. The indicators are being field trialled in 2014.

A workshop on the framework and accommodating step-by step guidance on how to develop ES indicators has already taken place for the Montado exemplar that will trial the approach. Two further workshops with more stakeholder engagement involved are also planned for the Dublin exemplar (August-September) and with the Wine exemplar (November). Preparation work on how to best engage with stakeholders was undertaken and several information documents about each of the participating organisations and tools/instruments has been explained in documents shared with the wine organisation in England. In addition, a brief review of how wine production depends and affects ES has been produced.

Sub task 4.2.3 Enhancement of information tools to support accounting and ratings systems: This task will review and refine criteria for a range of standards, certification and ratings schemes, and will explore the potential to further elaborate existing and develop new LCA-based tools to incorporate ES/NC. The use of LCA for EPD criteria setting and its effectiveness as a communication tool will be trialled in the wine industry exemplar (T2.2). To start this process, the possibility of, and interest in, certification and labelling is being introduced to the

stakeholders where these met various degrees of interest. Further work in this sub-task will be linked closely to the demands and needs from the stakeholder side.

In the Global exemplar, EFI is working on exploring certificate frameworks used in REDD+ projects (e.g. CBU) to explore the possibility to link to ES/NC indicator frameworks, and/or suitable labels and certification frameworks.

In the wine exemplar, the dialogue with local wine producers in England is being used to identify their needs and priorities and how OPERAs developments could be useful to them. Consulting and involving the stakeholders in this process is crucial in order to have useful instruments and buy-in from the potential users to test the instruments we aim to develop. The process takes longer than anticipated although it is important to know what kind of needs OPERAs will satisfy. At this point denkstatt, EFI, WCMC and LUND supported the exemplar in identifying the key stakeholders, their needs, business goals, problems and becoming familiar with the local context. denkstatt attempted to involve the Bulgarian wine producers and plan to continue in this direction. In general, work in the wine and cork exemplar has not yet progressed to the question of which accounting and rating systems can best support their work.

Sub task 4.2.4 Improve data and information storage and presentation including web-based visualization interfaces: WP4 had a joint brainstorming meeting on how to further develop tools and user guidance. In a Disney Method exercise, moderated by denkstatt, potentials for improved presentation, visualisation and data storage were developed. Work is ongoing in individual working groups as well in drafting a first concept of how to present tools to the public (WP5 Resource Hub). TIAMASG is taking a lead on technical implementation. Content has been provided by WP4 as descriptions of the planned tools (see MS41 (MS4.2), MS42 (MS4.3), MS43 (MS4.4), MS46 (MS4.7)) and a connected decision tree to guide users to relevant tools depending on their individual needs (MS 51).

As one example, *Our Ecosystem* (OE) webmapping tool (ECM) will be developed in the Global, French alps, Wine, Montado, Balearic islands exemplars in ways in which their data can be incorporated for visualisation. The first round of data has been received for the French Alps exemplar and an OE application for stakeholders is under development. An early version of this application was demonstrated at the Lisbon meeting in May 2014.

Task 4.3 – ES/NC Decision Support Tools (Task lead ETH)

Sub task 4.3.1 Multicriteria decision analysis: This task integrates the ES/NC concept into performance evaluation of different options/alternatives in spatial and non-spatial MCDAs. It will allow the accommodation of a variety of ES/NC performance measures (e.g. quantitative, qualitative, monetary and non- monetary, rating scales, directly assessed preferences and model-derived performance measures). The principal strengths of MCDA in multi-dimensional

analyses of sensitivity, trade-offs, and uncertainties within heterogeneous decision environments are currently further integrated and adapted to the ES/NC concepts, and methods will be coupled to tailor them to respond to specific ES/NC rationales. The integration of safety, social, and economic or health indicators is considered. Other decision-support tools and methods such as MCA, ToSIA and mDSS including various types of Environmental Assessments will also employ approaches of relevance to MCDA. Biotope has developed and tested an ad-hoc MCDA framework for offsetting impacts on ecosystems. Work to formalize a generic method to replicate this has begun.

Sub task 4.3.2 Cost-Benefit Analyses: This task aims to improve the operationalisation of CBA integrating values of ES/NC in close cooperation with T3.3. Special attention will be given to discounting factors and distributional impacts using weightings for different socio-economic groups.

Sub task 4.3.3 Environmental assessments: This task will focus on enhancing ES/NC representation in impact assessment tools (including sustainability assessments, SEA, and EIA). ES/NC needs to be integrated in a systematic way for the evaluation of potential impacts on the environment of projects, plans or programmes – including policy instruments. EIA, risk assessments and SEA are particularly well established and the subject of EU Directives which provide for their statutory application in certain contexts and require their findings to be taken into account as part of the decision-making process. Biotope initiated an analysis of the permitting of a large river restoration and flood protection project, in the Alps exemplar study area, to investigate when and where ES/NC concepts are used or could be used.

Sub task 4.3.4 Scenario and foresight tools: This task aims to integrate the ES/NC concept intotechniques that are used to support scenario generation, which is especially relevant for the tested decision-support systems. T4.3-4 will facilitate the integration of quantitative (e.g. models) and qualitative (e.g. systematic expert knowledge) for potential future development in the context of ES/NC. Information from T4.3-4 will replace the many general scenarios that are not tailored to ES/NC. Strong interactions with Task 4.3.5 will allow validation in collaborative environments. Work on the scenario tool and the development of scenarios for the different exemplars is currently ongoing

Sub task 4.3.5 Improving existing and developing innovative ES representation (visualization) methods and user interfaces: Task 4.3.5 will focus on developing interfaces to foster the use of decision-support tools and methods to better and more accurately include information on ES/NC into decision-making processes. For this purpose a demand analysis was conducted that to identify user needs in practice. The tools and methods will range from various computer software frameworks and applications to collaborative platforms including improved 3D landscape visualizations and mobile assessment tools. The social design and the governance conditions necessary for the successful operationalisation of the tools is being identified and

trialled iteratively within the exemplars in T2.2. To ensure the political feasibility of decision alternatives implemented in the decision-making tools and methods, we will incorporate political parameters based on a systematic analysis of boundary conditions (T3.4) due to the given and expected governance context relevant for the ES/NC issues.

TIAMASG improved the mDSS desktop decision support software instrument by creating a web interface and translating a first part of the existing mDSS instrument into a web based instrument named mDSSweb. mDSSweb is completely compatible with mDSS, but more accessible to the scientific community via the Internet (currently inside of the NetSyMoD approach and will be available under WP5 Resource Hub / Common Platform umbrella). The instrument will be used in the OPERAs exemplars and in collaboration with SYKE (Finland) partner from the OpenNESS project the instrument is intended to be used also in the adaptive management of the Lower Danube River Wetlands System which is an OpenNESS case study.

Task 4.4 – Implementation and uptake of ES/NC concepts

Sub task 4.4.1 Design and 'success' criteria in implementing ES/NC concepts: A report has been developed to provide a conceptual understanding of what 'implementation' means within this sub-task and to provide a basis for describing and analysing implementations as well as for developing guidance in designing implementations that take up ES/NC concepts in different contextual arenas. Design and evaluation criteria have been identified from surveys of theory and practice and from reports that reflect the concerns of different stakeholders. In continuing work the initial set of criteria will be validated and these will feed into the further analysis of implementations in sub-tasks 4.4.2-6 and into the development and testing of design guidance principles

Sub task 4.4.2 Design of analytical methods and protocols to assess implementation: Work on this task, which develops analytical methods and protocols for evaluating costs and cost-structures of implementation, especially transaction costs, depends on output from sub-task 4.4.1 and will begin in the next reporting period.

Sub task 4.4.3 Implementations of market-based approaches: Work has concentrated on PES and Offsetting with an emphasis on describing and analysing implementation experiences, as well as on understanding design choices and their implications. In the case of PES, which has a well- documented history, design choices and implications have been reviewed against the criteria identified in 4.4.1 and the outcomes analysed to deliver first sets of design guidance principles and lessons. These have been tested against some actual PES scheme designs and it has been possible to demonstrate potential utility as a screening and comparing tool for highlighting strengths and weaknesses of designs. Suitable candidate exemplars for testing within OPERAs were identified (e.g. Global REDD+, Danube, Balearic Islands). Interest in the offsetting case has focussed so far on the No-Net-Loss (NNL) criterion and on identifying important design choices that relate to goals/purpose, characteristics of the applications

context, ease/difficulty of implementation, and possible outcomes. In the next period alternative ways of implementing NNL through offsetting schemes will be characterised and assessed against the stakeholder-relevant criteria identified in 4.4.1. Scheme design alternatives will be suggested and some of these tested in exemplars. Suitable candidate exemplars were identified (Alps, Scotland, Lower Danube, Europe).

Sub task 4.4.4 Implementation of approaches based on spatial planning, permitting, and direct investment, including Green Infrastructure (GI) Interventions: Work has emphasised the potential for making the concepts more integral to spatial planning decision making processes, so that decisions are better able to reflect and maximise the full set of ecosystem benefits, including cultural values, use benefits (actual and potential), cost savings, benefits distributed over many users/uses, and benefits of high value to vulnerable or disadvantaged groups. Interest has been in identifying where and how changes can be introduced into existing spatial planning and governance arrangements to integrate often overlooked or under-represented benefits. Reviews of the theory and practice of spatial planning are in progress, as well as governance critiques that emphasise the role of participatory approaches and alternative governance arrangements, such as Critical Urban Theory. Reviews are also being made of a set of pioneering implementations of ecosystems-based approaches in spatial planning and participatory governance, such as those used in defining marine conservation zone boundaries. Experiences from pioneer implementations are being screened for insights they might offer into contextual factors relevant to implementation design, obstacles to change and ways to overcome these, choices in implementation design, and the implications and consequences of particular design choices. Findings are being assessed against criteria identified in Task 4.4.1. In continuing work, design guidance for improving spatial planning and governance practices will be developed and tested; e.g. in the Irish exemplar.

Sub task 4.4.5 Implementations in Green Business and Finance: Progress has focussed on two major strands of work: (a) schemes for certification, labelling, reporting and rating, (voluntary) protocols and standards, trade regulations and criteria for subsidies. For this a review of a set of existing schemes and implementations is currently carried out, which uses the criteria identified in Task 4.4.1. Future work will focus on suggesting and testing implementation design guidance principles. Suitable test cases include the Montado exemplar (b) novel modalities and schemes for conservation and biodiversity financing. This has focussed so far on evaluating operational issues in the implementation of the NNL principle and crowd-funding as a novel financing mechanism. The work on financing within task 4.4 is intended to contribute to the development of a business plan to secure long-term sustainability of the Resource Hub (WP5).

Task 4.5 – Guidance on Choice and Application of Instruments

Sub task 4.5.1 Coordinating Instruments Development: Both WP-internal and cross-WP cooperation are crucial to achieve the objectives of WP4 and to develop improved ES/NC tools and instruments that fit the demands from policy making and practice while incorporating the

latest scientific methods and approaches. This task facilitates the interaction between tasks and WPs by (i) mapping and timing information flows and feedback loops; (ii) organizing regular WP-wide workshops that target the interfaces between constituent tasks; and (iii) holding intermediate video-conferences of task leaders. Frequent communication with other WPs at a task and direct level ensure that instrument development benefits from progress in other parts of the project and that updated instruments can be tested and applied in the Practice exemplars. At the end of the project, the developed tools and instruments will be made available through the Resource Hub (T5.1).

Communication between the partners has been a priority and resulted in identifying a list of 19 tools and instruments across tasks 4.1 to 4.3 that are employed within implementations described by task 4.4. These tools, their development needs and potentials as well as use in the exemplars were identified (MS41 (MS4.2), MS42 (MS4.3), MS43 (MS4.4), MS46 (MS4.7)) and under the lead of EFI regularly communicated across WP at regular project meetings in the form of presentations, posters, documents, direct exchange and flash-talks. Each instrument is matched with at least one exemplar, and vice versa. Further development, exemplar-related and stakeholder discussions are followed in each exemplar individually. Regular task leader and WP4 meetings ensure that synergies between instruments and logical connections between instruments are identified and followed up. In this work all WP4 partners were involved as this links directly to tasks 4.1 to 4.4 content work.

First steps on finding links and developing user guidance on which tool to use for which purposes has started. This has involved the conceptualisation and initial design of a decision tree that describes how the informational and analytical tools and instruments under development in OPERAS WP4 (as well as counterpart tools and instruments already extant or being developed elsewhere) are combined and sequenced to provide flows of information necessary to support decision making and action leading to improved ecosystem management outcomes. A proof of concept has been achieved and the decision tree will be further developed to also include illustrative examples based on the OPERAs exemplars and to interface with the WP Knowledge's decision tree under development in WP Knowledge. The final product will to become part of the OPPLA user interface.

Sub task 4.5.2 Synthesizing operational potentials: This task connects the demand for operational ES/NC instruments from T4.1 with the insights from the development of the broad range of tools and instruments in T4.2-4 and combines them in a synthesis of the operational potential of improved existing and innovative new instruments. The tools and instruments will be presented both in generic categories as well as in clusters for different types of end-uses. Road maps for action will be developed for different policy fields, for example the EU 2020 biodiversity strategy or the EU resource efficiency flag ship initiative, acknowledging the interaction, coherence, and conflicts among these addressed policy fields. Network analysis of operational potentials with regard to policy fields and related actors will ensure transparency and

comprehensibility of the synthesis approach. This work will be informed by and partly structured on the basis of insights from the implementation analyses of Task 4.4 and the design guidance produced from that task.

2.4.3 Deviations

D4.1: In agreement with the European Commission, Deliverable 4.1 "Report and Policy brief on existing and emerging policy needs and opportunities" was delayed by one month. The key reason for this delay was the plan to integrate the results of an EU-level stakeholder workshop into the deliverable (see MS44 (MS4.5) below).

MS44 (MS4.5): The milestone MS44 (Task 4.1 with possible synergies to Task 4.4), was planned to be carried out as an EU-level stakeholder workshop in Brussels. The workshop concept was fully developed (e.g. background paper) and invitations were sent out to around 80 experts. However, despite IEEP's and the WP4 team's efforts only three participants confirmed their participation and therefore the workshop had to be cancelled. The low participation rate was likely to be due to a number of workshops taking place in Brussels during the same month. MS44 (MS4.5) is now planned to be changed into an online stakeholder survey and rescheduled for month 25, with a view to supporting D4.2. MS48 (MS4.9) (MS40 (MS4.1).3) "emerging needs workshop (EU level)" (Task 4.1) continues to be planned to take place in month 32.

2.4.4 Use of resources

See Table 7 – Work Package Person Months per Partner[2]

[2] Differences between the in person months reported here and those in the DOW arise from the employment of junior staff who are cheaper, but need more time to undertake the work. Further in some cases there were reallocations to increase the travel budget to make successful cooperation across partners, tasks and WPs possible.

For EFI, the 3rd party agreement is only currently prepared, so EFICEEC will invoice their person months in the following period, when the agreement is in place

2.5 WP5: Resource Hub

2.5.1 Task Objectives

Task 5.1 – Resource Hub development

1. To identify communities of practice and user needs (T5.1.1)
2. To design the structure of the Resource Hub (T5.1.2)
3. To Construct the Resource Hub (T5.1.3)
4. To ensure maintenance and perennity of the Resource Hub (T5.1.4)

Task 5.2 – Stakeholder engagement and facilitation

1. To develop a stakeholder analysis and engagement plan (T5.2.1)
2. To set-up a manage the OPERAs User Board (T5.2.2)
3. To facilitate stakeholder engagement in selected Exemplars (T5.2.3)
4. To monitor stakeholder engagement (T5.2.4)

2.5.2 Progress towards objectives

Task 5.1 – Resource Hub development

Sub-task 5.1.1 Identification of communities of practice and user needs assessment: A meeting was held between the core group for OPERAs and OpenNESS in 2013, Amsterdam, to discuss and plan the overall development of the resource hub (now known as OPPLA). Upon finding a common way forward a first draft of a Scoping Document was developed which set out a common vision - “Empowering European communities to improve natural resource management for human well-being”, a common set of deliverables and milestones, potential content of the resource hub and user groups.

Working with OpenNESS, end users of the resource hub were identified, this list was further refined through a consultancy undertaken by Countryscape to identify a process for the development of the branding for the resource hub. The needs of the users and how they would potentially use the resource hub have been explored through both OPERAs and OpenNess, using the User Boards. It is recognised that this is an iterative process and user needs will be assessed during each User Board meeting as wire frames and beta versions of the resource hub are released and user tested. Meetings have also been held with the European Commission and European Environment Agency to ensure plans for the development of the resource hub meet expectations and link with other initiatives such as BISE.

An Ecosystem Services Community for Scotland has also been established (ESCom Scotland http://escomscotland.wordpress.com/). ESCom is a community of practice which aims to

support collaboration between science, policy and practice to better manage Scotland's natural resources. ESCom is a prototype for how other communities of practice might be developed as part of the resource hub.

Sub-task 5.1.2 Design the structure and content of the resource hub: The first design meeting for the resource hub was held in Wageningen (7-8 April 2014). The purpose of this meeting was to decide on key functionalities for the resource hub, to allocate different tasks across the different partners in both consortiums and to identify the Minimum Viable Product (MVP). The point of developing a MVP and making the development of the resource hub modular, allows for versions of the resource hub to be released frequently and to allow for user testing.

Countryscape have been further engaged to develop the branding of the resource hub, which will influence components of its design. Drafting of the design guidelines for the resource hub has started.

Task 5.2 – Stakeholder engagement and facilitation

Sub-task 5.2.1: Stakeholder analysis and engagement plan: Stakeholder engagement is central to the OPERAs project, as the on-going and close collaboration with existing and future users and clients of ES/NC valuation is key to the ultimate success of the project. Therefore a stakeholder engagement plan was developed that defines the specifics of the involvement. It guides stakeholder activities across the project, including work in the Exemplars (WP2), the Resource Hub (WP5) and outreach activities (WP6). The first version of the stakeholder engagement plan was completed in project month 9 and in the first reporting period it has primarily guided the stakeholder mapping and selection for the OPERAs Userboard.

The basis for the stakeholder engagement has been the thorough identification and analysis of stakeholders, which was carried out based on inputs from consortium partners, existing networks, previous and on-going projects and advice from external resource experts. The analysis provided tools for selecting stakeholders to ensure the inclusion of diverse groups and individuals from government, civil society, business, research and policy-makers that are representative of the different, but relevant societal settings.

In light of the cooperation with the OpenNESS project it has been agreed that the stakeholder engagement plan would be a living document in which on-going and past stakeholder engagement activities will be recorded, thereby avoiding overlap of critical stakeholders who are contacted.

Sub-task 5.2.2: Setting up and managing the OPERAs User Board: Based on the stakeholder engagement plan the project team set up an internal database in which consortium partners could enter contact details of relevant future users and clients of ES/NC valuation. Contributions

to the database include stakeholders from a European and international level as well as local stakeholders from the exemplars.

Considering the objectives of the OPERAs User Board the project team decided to invite a mixture of European/international and local, exemplar stakeholders, each bringing in different perspectives on the challenges and opportunities of ES/NC operationalization and valuation. As per the Grant Agreement the first User Board workshop took place in November (28 and 29) 2013. For the location the project team agreed on Brussels due to its central location and proximity to a number of key stakeholders at the European level.

15 stakeholders from government, civil society, business, research and policy-making attended the first workshop, thereby covering all relevant stakeholder groups. From the project consortium, each work package and key area of activity was represented and the meeting was attended by two OpenNESS colleagues. The objective of the first workshop were formulated as: to identify and map the needs stakeholders have for operationalizing ES/NC in their work and to see if these are covered by OPERAs. The User Board members identified 7 clusters of challenges and for each of these they identified tools, knowledge and other resources that they would need to meet the challenges. Based on these outputs the OPERAs team reviewed the needs and evaluated how they might be addressed in the project. In summary, the OPERAs project is already planning to address 85% of the identified needs, whereas 9% of the needs could be considered and further addressed by the project, and only 6 % of the needs will most likely not be addressed within OPERAs (according to the current planning). Stakeholders and the project team together developed ideas about next steps in the collaboration, including the preferred way of on-going engagement with the project and it was agreed that a dedicated virtual space should be established through which the User Board members receive up-to-date project information and can easily comment on and discuss the development of knowledge and tools. The virtual space will be set up and the first discussion will begin soon.

Stakeholder evaluation showed that they were (very) satisfied with the workshop and that the majority (75%) is confident that their input and suggestions are adequately taken up by the project team.

The second physical User Board meeting will be held on 6 and 7 November 2014 in Lisbon. It will include a dedicated discussion on the development and use of OPPLA by OPERAs and OpenNESS.

Sub-task 5.2.3 Facilitation of stakeholder engagement in selected exemplars: As from the beginning of the OPERAs project it has been made clear to the exemplar leads that professional facilitation services for workshops with stakeholders are available. Through numerous discussions during the current reporting period, it became clear that it would be important for exemplar leads to first invest considerable amount of time in specifying the

objectives of the exemplars before defining the stakeholder engagement needs. Only towards the end of the reporting period had the discussions on stakeholder engagement in selected exemplars became more concrete. It was agreed that professional workshop facilitation would be used in the Rhone-Alps exemplar. Furthermore there are ideas for professional stakeholder engagement in the Dublin, the Wine, the Global and the European exemplars. Furthermore, it has been agreed that ad-hoc advice could be given at the level of individual exemplars.

Subtask 5.2.4 Monitoring and corrective action for stakeholder engagement: Based on the experience within subtasks 5.2.2 and 5.2.3, T5.2 developed a plan for the monitoring of stakeholder engagement within OPERAs. This will be done using online (or if needed paper-based) questionnaires that will be distributed after every stakeholder event that is part of OPERAs. The questionnaire will consist of 6 standard questions geared towards stakeholder satisfaction with the engagement and can be combined with additional questions determined by the event organiser. The results of each questionnaire will be centrally collected and brought to the attention of the Project Management Team, who will flag any quality issues with the event organiser and jointly find measures to improve the stakeholder engagement activities.

The monitoring and corrective mechanism has been put in place at the end of the first reporting period and will deliver first results during the second reporting period.

2.5.3 Deviations

At the request of the European Commission, Work package 5 is being implemented in collaboration with the FP7 project OpenNESS. As a result of this collaboration the DoW has changed with respect to deliverables and milestones as well as how the work was envisaged to be implemented. A common set of revised deliverables has now been agreed between OPERAs and OpenNESS in an amendment to the contracts of the two projects.

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2.5.4 Use of resources

See Table 7 – Work Package Person Months per Partner

2.6 WP6: Outreach & Dissemination

2.6.1 Task Objectives

Task 6.1 – Constituency building, outreach and project dissemination

1. To disseminate project outcomes to science, policy and practice (T6.1.1)
2. To reach out and build stakeholder constituencies around OPERAs (T6.1.2)
3. To organise and OPERAs summer school (T6.1.3)
4. To organise an OPERAs peer-to-peer exchange conference (T6.1.4)

2.6.2 Progress towards objectives

Over the first reporting period WP6 has focused on developing a dissemination plan (D6.1) and communication methods such as social media and short films (D6.2). These activities have been developed to disseminate project outcomes and to create an online community that will eventually be transferable to the resource hub.

The OPERAs project has dissemination and outreach written into the project design, throughout the work packages. The WP6 activities cannot be seen in isolation from activities in other work packages, particularly WP4 (Instruments) and WP5 (Resource Hub), and the overarching OPERAs research design. Specific examples of the latter include the extensive stakeholder engagement in WP2 (Practice) and WP5. The work completed by WP6 in the first reporting period has been driven by the aims identified in the Dissemination Strategy and Plan (D6.1):

- To identify and connect with target audiences
- To promote OPERAs and establish an Ecosystem Services Community
- To disseminate project results to the scientific community
- To promote the resource hub

Task 6.1 – Constituency building, outreach and project dissemination

Sub-task 6.1.1 Project dissemination: WP6 has worked alongside web-designers to create an engaging, content-rich website that provides information in plain English wherever possible so as to appeal to a non-scientific audience in addition to a scientific one. To appeal to as wide a group as possible, the website incorporates various different media types, including videos, blogs, twitter and standard text. In parallel the OPERAs project brand and logo were developed. This was established with input from across the consortium. The brand and logo have been incorporated into a number of project dissemination tools, including: project trifold flyer, posters, business cards, pop-up banners, powerpoint templates.

Sub-task 6.1.2 Outreach and constituency building: As described in section 2.5, OPERAs collaborates closely with OpenNESS on developing the Resource Hub OPPLA. As part of this activity target audiences have been identified and future joint activities (including those described below and under WP5) will target these groups. Support in establishing the Ecosystem Services Community Scotland provided some first inights.

Social media is being employed in recognition of its potential for dissemination and to help build an engaged audience around OPERAs outputs. The project has active Twitter, LinkedIN, Youtube and Facebook accounts to target the potential stakeholders that utilise each platform. Efforts are being made to establish a successful online identity for the project via social media and blogging activity. The project aims to build a large, engaged audience, whom we hope to be transferable to outputs such as the resource hub. PIWIK analytics runs on the website to gain an understanding of how stakeholders engage with OPERAs online (monitoring downloads, page views etc.). This information will be used to inform development of the resource hub.

Section 4.6 provides a detailed overview of specific dissemination activities.

Sub-task 6.1.3 OPERAs summer school: Rather than organising a single OPERAs summer school agreement has been reached that both OPERAs and OpenNESS will contribute to the existing Alter-NET summer schools throughout the project. A summer school towards the end of OPERAs would have a greater focus on OPERAs results.

Sub-task 6.1.4 OPERAs conference: This is planned for the final year of the conference, and preparation have not yet started. However, there is agreement that the event will be organised n collaboration with OpenNESS.

2.6.3 Deviations

No significant deviations from the DOW occurred in terms of progress towards objectives or deliverables for the Tasks within WP6.

2.6.4 Use of resources

See Table 7 – Work Package Person Months per Partner

3. Deliverables and Milestones

Table 3 Project Deliverables

Del. no.	Deliverable name	Version	WP no.	Lead beneficiary	Nature	Dissemination level[3]	Delivery date from Annex I (project month)	Actual / Forecast delivery date Dd/mm/yyyy	Status	Comments
D1.1	Management of project dissemination		1	1	O	CO	3	27/02/2013	Submitted	
D1.2	OPERAs Research Implementation Plan		1	1	R	PU	6	30/05/ 2013	Submitted	
D6.1	Dissemination strategy and plan		6	1	R	PP	12	29/11/ 2013	Submitted	
D2.1	Description of study design: Exemplars, stakeholder needs and tested tools/instruments		2	13	R	PU	15	28/02/ 2014	Submitted	
D4.1	Report and Policy brief on existing and emerging policy needs and opportunities		4	10	R	PU	16	09/05/ 2014	Submitted	Delivered 6 weeks late due to workshop and illness (sanctioned by Project Officer)

D1.3	Updated Research Implementation Plan		1	1	R	PU	18	29/05/ 2014	Submitted	
D3.1	Transferable geo-referenced metrics, and GIS based quantification and valuation functions		3	12	O	PU	18	29/05/ 2014	Submitted	
D5.1	Report on testing the inter-operability with OpenNESS Clearing House		5	9	R	PU	18		Not Submitted	WP5 Deliverables changed due to collaboration with the OpenNESS project
D6.2	Short Films describing issues		6	1	O	PU	18	29/05/ 2014	Submitted	

Milestones in the first reporting period

Some of the milestones have been altered in the OPERAs project and new ones have been added for a number of reasons. There has also been an attempt to renumber the milestones to include details of which work package they have come from (e.g. MS6 would be the first milestone from WP2). However, for consistency during this reporting period, the original numbering from the OPERAs DoW List of Milestones has been used in the table below with the revised numbers given in brackets. A change to the DoW will be required to produce a new table of milestones that accurately reflects the up-to-date milestones.

Table 4 Project Milestones

Milestone no.	Milestone name	Work package no	Lead beneficiary	Delivery date from Annex I	Achieved Yes/No	Actual / Forecast achievement	Comments
MS1 (MS1.1)	Note on agreed communication procedures and quality control, mailing lists	WP1	1	Month 3	No		This was discussed within the PMT and noted in the meeting minutes
MS2 (MS1.2)	Consortium Assembly	WP1	1	Month 12	Yes	Month 11	
MS6 (MS2.1)	Database design developed	WP2	1	Month 4	Yes	Month 4	
MS7 (MS2.2)	Review of existing ES/NC assessment protocols	WP2	1	Month 4	Yes	Month 3	

Milestone no.	Milestone name	Work package no	Lead beneficiary	Delivery date from Annex I	Achieved Yes/No	Actual / Forecast achievement	Comments
MS8 (MS2.3)	Preliminary report on knowledge gaps and demand for instruments	WP2	26	Month 8	Yes	Month 8	
MS9 (MS2.4)	Blueprint protocol for systematic reporting of exemplars	WP2	1	Month 8	Yes	Month 6	
MS10 (MS2.5)	Initial discussion of the reporting format in WP4	WP2	5	Month 9	Yes	Month9	
MS11 (MS2.6)	Description of study design: exemplars, stakeholder needs and tested tools/instruments	WP2	5	Month 12	Yes	Month 12	
MS12 (MS2.7)	Ranking of effectiveness of ES/NC based measures as valued in Scientific literature	WP2	26	Month 16	Yes	Month 16	

Milestone no.	Milestone name	Work package no	Lead beneficiary	Delivery date from Annex I	Achieved Yes/No	Actual / Forecast achievement	Comments
MS13	Internal Report on knowledge gaps and demand for instruments reported to WP3 & WP4	WP2	26	Month 18	No		Milestone was removed
MS14 (MS2.8)	Database designed to compile lessons learned across WP	WP2	1	Month 18	Yes	Month 18	
MS21 (MS3.1)	Set strategy for first applications and identify development needs, WP meeting	WP3	3	Month 3	Yes	Month 3	
MS22 (MS3.2)	Delivery of draft conceptual framework of valuation approach	WP3	25	Month 6	Yes	Month 19	New date of delivery was agreed as June 2014
MS23 (MS3.3)	Identification of knowledge & policy gaps in the context of exemplars and instruments	WP3	10	Month 12	Yes	Month 18	New date of delivery agreed as May 2014
MS24 (MS3.4)	Coordinated application of social valuation to selected exemplars	WP3	11	Month 16	No	Month 20	New date of delivery agreed as July 2014

Milestone no.	Milestone name	Work package no	Lead beneficiary	Delivery date from Annex I	Achieved Yes/No	Actual / Forecast achievement	Comments
MS25	Identification of policy needs, cross jurisdiction issues, PR arrangements	WP3	5	Month 17	Yes	Month 18	Merged with M23
MS26 (MS3.5)	Summary table of knowledge needs for exemplar studies	WP3	13	Month 17	Yes	Month 18	New date of delivery agreed as May 2014
MS40 (MS4.1)	Module instruments interaction plan ready/revised	WP4	6	Month 3	Yes	Month 3	
MS41 (MS4.2)	Selection of priority instruments for further development	WP4	6	Month 12	Yes	Month 9	
MS42 (MS4.3)	Means for enhancing selected ES/NC tools and accounting and ratings systems identified	WP4	8	Month 12	Yes	Month 15	New date of delivery agreed as February 2014
MS43 (MS4.4)	Procedures for the integration of ES/NC into existing decision-support tools	WP4	14	Month 12	Yes	Month 15	New date of delivery agreed as February 2014

Milestone no.	Milestone name	Work package no	Lead beneficiary	Delivery date from Annex I	Achieved Yes/No	Actual / Forecast achievement	Comments
MS44 (MS4.5)	Workshops with stakeholders	WP4	5	Month 12	No	Month 25-32	Rescheduled and changed to online survey
MS45 (MS4.6)	Policy gaps and needs assessment workshops	WP4	10	Month 14	No		Ongoing (see discussion above)
MS46 (MS4.7)	Data capture, indicator-based, and information tools selected for enhancement, development and trial	WP4	8	Month 18	Yes	Month 18	
MS47 (MS4.8)	Report on how existing decision-support tools and methods are able to cope with the ES/NC concept	WP4	14	Month 18	No		To be rescheduled
MS48 (MS4.9)	Analysis of framework conditions securing successful implementation of DS tools and methods	WP4	14	Month 18	No		To be rescheduled

Milestone no.	Milestone name	Work package no	Lead beneficiary	Delivery date from Annex I	Achieved Yes/No	Actual / Forecast achievement	Comments
MS49 (MS4.1)	Selection of decision-support tools and methods for exemplars	WP4	14	Month 18	No		To be rescheduled
MS57 (MS5.1)	RH design based on user needs complete	WP5	8	Month 12	No		Milestone altered due to the developing work with OpenNESS on the Common Platform (OPPLA)
MS58 (MS5.2)	Report describing the initial assessment of user needs and first design of the Resource Hub	WP5	8	Month 12	No		Milestone altered due to the developing work with OpenNESS on the Common Platform (OPPLA)
MS59 (MS5.3)	User Board Workshop	WP5	7	Month 12	Yes	Month 12	
MS64 (MS5.4)	Website launched	WP5	1	Month 3	Yes	Month 12	
MS65 (MS6.1)	First Project Flyer	WP6	1	Month 6	Yes	Month 9	OPERAs branding and logo were completed in Month 6 hence the flyer was delayed to Month 9
MS66 (MS6.2)	Outreach Plan	WP6	1	Month 14	No		Ongoing

4. Project Management

4.1 Consortium management Tasks and Objectives

Central management within the OPERAs project is undertaken by the Daily Management Team (DMT) based at the University of Edinburgh (which includes the Coordinator, the Deputy Coordinator and the Project Manager). The Project Management Team (PMT) supports the Coordinator in fulfilling obligations towards the Commission and has overall responsibility for liaison between the project partners, for analysing and approving the results and for proper administration of the project. Management of the different components of the project rests with the co-leaders of each work package, who are responsible for the WP deliverables. Along with the PMT, they ensure that the WPs are effectively integrated and eliminate any duplication of effort.

The consortium management tasks of the DMT and PMT in the first reporting period of the project are summarised below

- Overall administrative, legal and financial management of the OPERAs project, including administering the advance payment from the European Commission regarding its allocation between partners in accordance with the grant agreement without unjustified delay.
- Organising two project meetings (see Table 5.1).
- Writing up minutes and actions for all project meetings and circulating them to all partners.
- Attending WP meetings as necessary to promote integration across WPs (see Table 5.2)
- Collaboration with our sister project OpenNESS including the creation of a task force to support the development of OPPLA
- Attending a meeting with representatives from the different Commission policy DGs

Table 5 Details of Project Meetings

Meeting	Date	Location	Attendees
First Project Management Team Meeting	19 December 2012	Amsterdam, Netherlands	WP Co-leaders
First General Assembly meeting (Kick-off meeting)	21-23 January 2013	Edinburgh, Scotland	All partners
Second General Assembly meeting	16-18 October 2013	Palma, Mallorca	All Partners
Third General Assembly meeting	19-21 May 2014	Lisbon, Portugal	All Partners
WP5 Stakeholder engagement	27 February 2013	Vienna	Prospex + UEDIN
WP5 Stakeholder engagement and mapping	12 April 2013	Brussels	Prospex + IEEP
Preparing the stakeholder meeting to introduce and discuss socio-cultural valuation work of WP3 in Scotland and how this feeds into a wider framework of research on valuation and quantification of ES/NC (held in June 2013)	23-24 April 2013	Edinburgh	VU-IVM: Astrid van Teeffelen UEDIN: Marc Metzger Telemeeting with UP
OPERAs/OpenNESS collaboration meeting	8 and 9 May 2013	Edinburgh	Working group
Stakeholder meeting to introduce and discuss socio-cultural valuation work of WP3 in Scotland and how this feeds into a wider framework of research on valuation and quantification of ES/NC.	13 June 2013	Edinburgh	VU-IVM: Astrid van Teeffelen UP: Ariane Walz & Katja Schmidt UCD: Craig Bullock & Deirdre Joyce UEDIN: Marc Metzger & James Patterson and ~10 stakeholders from policy and practice.
Userboard and WP5 discussions	3 July 2013	Brussels	Prospex + IEEP
OPERAs/OpenNESS collaboration meeting	12 and 13 November 2013	Brussels	Working group

Meeting	Date	Location	Attendees
WP5 strategy meeting	13 November 2013	Brussels	Prospex + UNEP-WCMC
User board preparation meeting	27 November 2013	Brussels	Prospx, VU-IVM, EFI, UNEP-WCMC
1st User board Workshop	28 and 29 November 2013	Brussels	Prospex, UEDIN, VU-IVM, EHTZ, EFI, UNEP-WCMC
WP5 strategy meeting	16 January 2014	Cambridge	Prospex + UNEP-WCMC
Meeting of the Global exemplar on combining changes in ES quantities with changes in ES values	27 January 2014	Amsterdam	UP: Katja Schmidt VU-IVM: Astrid van Teeffelen, Samantha Scholte, Mark Koetse
Stakeholder workshop in the Rhone-Alps exemplar	27 March 2014	Grenoble	Prospex + CNRS
ESCOM kick off meeting, presentation of planned WP3 work in Scotland as our common exemplar.	29 April – 1 May 2014	Edinburgh	VU-IVM: Willem Verhagen, ~100 stakeholders from science, policy and practice, including the Scottish Government Minister for the Environment.

Table 6 Details of Internet or telephone-based WP meetings

Meeting	Date	Location	Attendees
WP3 leads teleconference: Coordination of management in WP3	8 March 2013	Skype	VU-IVM: Peter Verburg, Astrid van Teeffelen KIT: Almut Arneth, Anita Bayer
1st WP4 task leader meeting	13 March 2013	Skype	WP4 task leaders
Preparation of stakeholder meeting (to be held in June 2013) to introduce and discuss socio-cultural valuation work of WP3 in Scotland and how this feeds into a wider framework of research on valuation and quantification of ES/NC	23 April 2013	Skype	VU-IVM: Astrid van Teeffelen UEDIN: Marc Metzger UP: Ariane Walz, Katja Schmidt
2nd WP4 task leader meeting	29 April 2013	Skype	WP4 task leaders
3rd WP4 task leader meeting	29 May 2013	Skype	WP4 task leaders
4th WP4 task leader meeting	19 June 2013	Skype	WP4 task leaders
5th WP4 task leader meeting	2 September 2013	Skype	WP4 task leaders
WP3 task leads teleconference	2 September 2013	Skype	VU-IVM: Astrid van Teeffelen KIT: Almut Arneth, Anita Bayer UCD: Deirdre Joyce, Craig Bullock ULUND: Lennart Olsson
6th WP4 task leader meeting	4 October 2013	Skype	WP4 task leaders
7th WP4 task leader meeting	28 April 2014	Skype	WP4 task leaders
Coordination between OPERAs and OpenNESS	4 March 2013	Skype	Prospex (OPERAs) + Wing (OpenNESS)
Rhone-Alps exemplar planning	21 March 2013	Skype	Prospex + CNRS
PMT teleconference	11 April 2013	Skype	PMT members

Meeting	Date	Location	Attendees
WP5 Coordination	16 April 2013	Skype	Prospex, UEDIN, UNEP-WCMC, Tiamasg
European exemplar planning	26 April 2013	Skype	Prospex + VU-IVM
Stakeholder engagement collaboration	19 June 2013	Skype	Prospex + OpenNESS (SYKE + ECNC)
PMT teleconference	3 September 2013	Webinar	PMT members
Stakeholder engagement in OPERAs	27 September 2013	Skype	Prospex + Denkstatt
Userboard preparation meeting	27 November 2013	Skype	Prospex + UEDIN
PMT teleconference	10 January 2014	Skype	PMT members
WP3 leads teleconference	15 January 2014	Skype	VU-IVM: Peter Verburg, Astrid van Teeffelen KIT: Almut Arneth, Anita Bayer
Agenda design for GA in Lisbon	4 February 2014	Skype	Prospex + UEDIN
Rhone-Alps exemplar planning	10 February 2014	Skype	Prospex + CNRS
2 teleconferences on application of socio-cultural and economic valuation methods in the Scottish exemplar (e.g. Pentland Hills Regional Park)	20 February 2014	Skype	UP: Ariane Walz, Katja Schmidt UCD: Craig Bullock VU-IVM: Mark Koetse
Teleconference and various email conversations on application of different socio-cultural and economic valuation methods in selected exemplars (e.g. Scotland)	January and February 2014	Skype	VU-IVM: Mark Koetse UCD: Craig Bullock UEDIN: Marc Metzger IEEP: Patrick ten Brink
WP3 task leads teleconference	06 March 2014	Skype	VU-IVM: Peter Verburg, Astrid van Teeffelen KIT: Anita Bayer UCD: Craig Bullock, Marcus Collier ULUND: Lennart Olsson CNRS: Sandra Lavorel

Meeting	Date	Location	Attendees
Teleconference between members of the meta-analysis team and the leaders of WP 3 Knowledge	11 March 2014	Skype	UBO: Sven Lautenbach, Heera Lee, Stefan Schmidt UFZ: Ralf Seppelt VU-IVM: Peter Verburg, Astrid van Teeffelen, Mark Koetse KIT: Almut Arneth, Anita Bayer
European exemplar planning	11 March 2014	Skype	Prospex + VU-IVM
Stakeholder engagement in exemplars	13 March 2014	Skype	Prospex + exemplar leads
Teleconference and email conversations on combining changes in ES quantities with changes in economic ES values	March to May 2014	Skype	KIT: Almut Arneth, Anita Bayer VU-IVM: Mark Koetse
European exemplar planning	19 April 2014	Skype	Prospex + VU-IVM
PMT teleconference	7 May 2014	Skype	PMT members
Userboard planning	9 May 2014	Skype	Prospex + UEDIN
Various email conversations on various tasks, milestones and deliverables among T3.3 partners (UCD, UEA, IEEP, IVM-VU)	2013-2014	Skype	IEEP: Patrick ten Brink UCD: Craig Bullock, Deirdre Joyce UEA: Ian Bateman VU-IVM: Mark Koetse

4.2 Cooperation with other projects/programmes

OPERAs cooperation with OpenNESS

The collaboration between the two groups has progressed well during the first reporting period. A joint working group was established to monitor and progress the joint areas of work between the two projects, which are (from the DoW):

- The two projects will have a common start date
- Organise joint project meetings to include: a) at least 2 policy meetings in Brussels (e.g. lunch debates), b) at least 1 project meeting elsewhere to plan collaboration (at an early stage of the work), c) ad hoc project meetings to implement collaboration
- Organise jointly at the end of the projects an Open Science Conference
- Produce joint Special Issue publications during the projects, linked also to the final conference
- Produce a joint stakeholder engagement and monitoring plan (to avoid overlap of individuals contacted)
- Communicate ideas/insights about protocols, methods and synthesis of exemplars/case studies - partner participation in workshops on a) method development (early on), and b) synthesis and comparison of results (later on)
- Explore options for collaboration in the Lower Danube exemplar/case study, to avoid redundancy and replication and compare results and lessons-learned (at the synthesis workshop, above)
- Coordinate communication and dissemination strategies and plans
- Compare the project policy briefs, and avoid confusion where differences in messages arise
- Ensure a high degree of inter-operability of the OPERAs Resource Hub and the OpenNESS Clearinghouse through a common platform
- Ensure the perennity of the Resource Hub/Clearinghouse common platform
- Develop a joint business plan with the aim of commercialising the Resource Hub/Clearinghouse common platform
- Coordinate Summer School(s) and other training elements
- Include common members within the project Advisory groups, especially the coordinators.

A sub-set of this working group has been established specifically to manage the development of the 'Common Platform' (now known as OPPLA). This includes the development of the business plan in support of the perennity of OPPLA. The joint working group and the OPPLA development team have now met on 6 different occasions during the first reporting period (see details in Table 5.2a). This has included meetings involving European Commission staff (DG RTD and DG Environment) and the European Environment Agency. An outcome of this process has been the harmonisation of deliverables that relate to OPPLA across the two projects. See section 3.5, for a description of progress on OPPLA.

The two projects have also collaborated on the establishment of stakeholder databases and are organising stakeholder meetings jointly. Documents on protocols and synthesis methods for the exemplars/case studies have been shared. Project partners working within the Lower Danube exemplar/case study have also met to share experiences and develop common interests. The two projects have exchanged policy briefs and coordinated communication and dissemination strategies.

Representatives from the two projects have also participated in the other project's general project meetings (4 meetings), and OPERAs was represented on the OpenNESS Advisory Board. A reciprocal arrangement is being put in place for the near future.

4.3 Changes in the Consortium or legal status of the beneficiaries

Parts of the tasks of European Forest Institute (EFI) are carried out by its Central-Eastern European Regional Office (EFICEEC) with its hosting institution Universität für Bodenkultur (BOKU) acting as Third Party, reimbursed via EFI.The abovementioned EFI Regional office has been set up for an initial pilot period of five years and is intended as a permanent structure. In the initial period, for the regional office EFICEEC EFI holds an agreement with a local so-called host organization. As per agreement between Universität für Bodenkultur (BOKU) and EFI on the establishment of EFI RO Central-Eastern Europe (signed 8/2010), EFICEEC is an integral part of EFI that is governed by EFI Terms of Reference and management practice. This agreement further states that EFICEEC staff reports to EFI management, the results of their work belong to EFI, they report for time use according to the EFI systems and practices, and work at EFI regional office premises, made available to EFI by BOKU. The payroll of EFICEEC employees is handled by BOKU, and the EFICEEC staff have a work contract with BOKU. EFICEEC are active in WP 4.

4.4 Development of the Project Website

See Section 2.6

4.5 Deviations from planned milestones and deliverables

Only one change has been made to the proposed deliverables. D5.1 (Report on the inter-operability with OpenNESS Clearing House) was not completed as new Deliverables for WP5 were created, based on the joint OPPLA work.

Changes have been made in some of the milestones to better enable to manage the project progress effectively and to reflect changes in the Deliverables arising from the joint OPERAs OpenNESS work on OPPLA. These changes are documented in Table 3 (above).

4.6 Dissemination activities in this period

Newsletters and flyers

- Flyer in circulation and social media blogs: ES information user needs - demand analysis www.ecosystemservices.ch/demands

Presentations at workshops and conferences

- Bateman, I.J. 2014, Economic value of ecosystem services, presented at 1st ESCOM meeting, 29 April-1 May 2014, Edinburgh, Scotland.
- Bayer, A.D., Arneth, A. & Pugh, T.A.M. 2014. Variation of the Climate Regulation Ecosystem Service under climatic and land use changes. GLP Open Science Meeting, Berlin 19-21 March 2014.
- Bondeau, A., Decock, S., Shi, S., Trabucchi, M. & Cramer, W. 2014. Assessing multiple ecosystem services from agricultural landscapes around the Mediterranean, based on a process-based ecosystem model. GLP Open Science Meeting (Special session in OPERAs context), Berlin 19-21 March 2014.
- Bullock, C. & Joyce, D. 2014. Socio-cultural valuation: OPERAs WP3 and input to exemplars. Stakeholder workshop Socio-cultural valuation in Scotland, Edinburgh, June 2013.
- Bullock, C. 2014. Socio-cultural values and Economics: Some Approaches. Presentation to OPENNESS Consortium meeting in Budapest 26.05.2014.
- Collier, M. 2013. Novel Ecosystems – Opportunities for Provision of Cultural Ecosystem Services. Presentation at 5th World Congress on Ecological Restoration, Madison, USA, 6-11 Oct, 2013.
- Decock, S., Bondeau, A., Shi, S. & Cramer, W. 2014. Modeling the functioning of Mediterranean agroecosystems to assess impacts of global change on ecosystem services. GLP Open Science Meeting (Special session in OPERAs context), Berlin 19-21

March 2014.
Derkzen, ML. Ecosystem services and the city: How can ecosystem service mapping aid urban planning decisions? SURE conference, Berlin, July 2013.

- Fader, M., Bondeau, A., Cramer, W., Decock, S., Geijzendorffer, I., Shi, S., Trabucchi, M. 2014. How much water and energy do we need for irrigation under climate change in the Mediterranean? GLP Open Science Meeting (Special session in OPERAs context), Berlin 19-21 March 2014.
- Geijzendorffer, I., Decock, S., Fader, M., Trabucchi, M., Bondeau, A. & Cramer, W. 2014. Comparing trends in supply and demand for ecosystem services for the Mediterranean region. GLP Open Science Meeting (Special session in OPERAs context), Berlin 19-21 March 2014.
- Krause, T. & Olsson, L. 2014. Governance of ecosystem services - A critical distinction to ecosystem functions. LUCID workshop presentation, May 5-6, Lund, Sweden.
- Lautenbach S. 2014. Trade-offs of land use from the ecosystem service perspective, University of Bonn, ARTS Seminar series.
- Lautenbach, S., Volk, M., Strauch, M., Whittaker, G. & Seppelt, R. 2014. Trade-offs of increasing bio-fuel crop production in a German watershed, GLP Open Science Meeting, Berlin, 19-21 March 2014.
- Lautenbach, S. 2013. Land use and Ecosystem Services - valuation and trade-off analysis, examples for polli-nation, food yield and water regulation, University of Bayreuth, Vortragsreihe Ökologie und Umweltforschung.
- Lautenbach, S. 2013. Zielkonflikte zunehmender Bioenergieproduktion Wasserqualitäts- und Wassermengenaspekte in einem deutschen Einzugsgebiet, Association of German Geographers (Deutscher Geographentag), Passau.
- Lautenbach, S. 2013. Land use and Ecosystem Services - valuation and trade-off analysis, examples for pollination, food yield and water regulation, INRES colloquium, University of Bonn.
- Lautenbach, S., Volk, M. , Strauch, M., Whittaker, G., Seppelt, R. 2013. Identifying trade-offs of increasing biogas production in a German watershed under climate change, presentation given at the MODSIM, Adelaide, Australia.
- Lavorel, S., Locatelli, B., Tappeiner, U. & Geneletti, D. 2014. Ecosystem service transitions in mountain socio-ecosystems. Global Land Project Open Science Meeting. Berlin, Germany, 19-21 March 2014.
- Lavorel, S., McIntyre, S., Colloff, M., Doherty, M., Murphy, H., Metcalffe, D., Dunlop, M., Williams, D., Wise, R. & Williams, K. 2014. Operationalising the concept of Adaptation Services. Resilience 2014. Montpellier, France, 5-8 May 2014.
- Lee, H. 2013. How much do we know about ecosystem services and their trade-offs? – A quantitative review, Presentation at the University of Bayreuth.
- Marbà, N., Duarte, C.M., Kendrick, G.A., Bastyan, G.R., Mazarrasa, I., Pere, M., Garcia-Orellana, J. & Arias-Ortiz, A. 2013. Re-vegetation facilitates recovery of seagrass carbon

sinks. CERF 2013, Toward Resilient Coasts and Estuaries, Science for Sustainable Solutions, 3-7 November 2013, San Diego, California (USA).

- Mazarrasa, I., Duarte, C.M., Marbà, N., Lovelock, C.E., Serrano, O., Lavery, P., Fourqurean, J.W., Kennedy, H., Mateo, M.A. & Steven, A.D.L. 2013. Seagrass meadows are significant deposits of carbonate. CERF 2013, Toward Resilient Coasts and Estuaries, Science for Sustainable Solutions, 3-7 November 2013, San Diego, California (USA).
- Mazarrasa, I., Marbà, N., Duarte, C.M., García-Orellana, J., Masqué, P. & Arias-Ortiz, A. 2014. Changes in seagrass (Posidonia oceanica) carbon sinks in the Balearic Islands during the Anthropocene.). Seagrass COST Conference, Olhao, Portugal, 4-6 March 2014.
- Rounsevell, M.D.A., Metzger, M.J. and the OPERAs partners (2013). New Techniques for Valuation of Ecosystem Services. ACES Conference, Florida, December 2013
- Ten Brink, P. 2014. Natural Capital Accounting and Policy, Presentation for the MAES High Level Group meeting, 22 May 2014, Brussels, Belgium.
- Ten Brink, P. 2014. Ecosystem Services in policy and practice: an international perspective, presented at 1st ESCOM meeting, 29 April-1 May 2014, Edinburgh, Scotland.
- Van Teeffelen, A.J.A. 2013. OPERAs framework for ES valuation and trade-off analysis in Scotland. Stakeholder workshop Socio-cultural valuation in Scotland, Edinburgh, June 2013.
- Verhagen, W. & Van Teeffelen, A.J.A. 2014. OPERAs: Scotland as a joint study area to enhance ES quantification, valuation and governance (on behalf of OPERAs WP Knowledge). 1st ESCOM meeting, Edinburgh, 1 May 2014.
- Volk, M. & Lautenbach, S. 2014. Integrating water and land resources management and ecosystem services by combining scenario analysis and optimization on different scales, GLP Open Science Meeting, Berlin, 19-21 March 2014.
- Walz, A. 2014. Compare methods of quantitative and qualitative social valuation, using monetary, non-monetary, and revealed and stated preference methods. Stakeholder workshop Socio-cultural valuation in Scotland, Edinburgh, June 2013.

Posters

- Bayer, A.D., Arneth, A. & Pugh, T.A.M. 2014. Modelling the effects of land-use change on carbon cycle - an Ecosystem Service perspective. Global Vegetation Monitoring and Modelling International Conference, Avignon, 3-7 February 2014.
- Trabucchi, M., Cramer, W., Bondeau, A. & Decock, S. 2014. The role of soils for sustainable ecosystem services in the Mediterranean Basin. GLP Open Science Meeting, Berlin, 19-21 March 2014.

Journal Papers published

- Bullock, C., Hawe, J. & Little, D 2014. Realising the ecosystem service value of native woodland in Ireland. *New Zealand Journal of Forestry Science*, in press.
- Casado-Arzuaga, I., Onaindia, M., Madriaga, I., Verburg, P.H. 2014. Mapping recreation and aesthetic values of ecosystem services in the Bilbao Metropolitan Greenbelt (northern Spain) to support landscape planning. *Landscape Ecology*, in press. http://dx.doi.org/10.1007/s10980-013-9945-2
- Chorus, C.G., Koetse, M.J., Hoen A. 2013. Consumer Preferences for Alternative Fuel Vehicles: Comparing a Utility Maximization and a Regret Minimization Model, *Energy Policy* **61**, 901–908.
- Duarte C.M., Sintes, T., Marbà, N. 2013. Assessing the CO_2 capture potential of seagrass restoration projects. *Journal of Applied Ecology* doi: 10.1111/1365-2664.12155
- Duarte, C.M., Losada, I.J., Hendriks, I.E., Mazarrasa, I. & Marbà, N. 2013. The Role of Coastal Plant Communities for Climate Change Mitigation and Adaptation. *Nature Climate Change,* 3: 961–968. DOI: 10.1038/NCLIMATE197
- Homolová, L., Schaepman, M.E., Lamarque, P., Clevers, J.G.P.W., De Bello, F., Thuiller, W. & Lavorel, S. 2014. Comparison of remote sensing and plant trait-based modelling to predict ecosystem services in subalpine grasslands. *Ecosphere,* in press.
- Lavorel, S., McIntyre, S., Colloff, M., Doherty, M., Murphy, H., Metcalffe, D., Dunlop, M., Williams, D., Wise, R. & Williams, K. 2014. Ecological mechanisms underpinning climate adaptation services. *Global Change Biology*, in press.
- Marbà, N., Díaz-Almela, E., Duarte, C.M. 2014. Mediterranean seagrass (*Posidonia oceanica*) loss between 1842 and 2009. *Biological Conservation*, in press.
- Rounsevell, M.D.A., Arneth, A., Alexander, P., Brown, D.G., de Noblet-Ducoudré, N., Ellis, E., Finnigan, J., Galvin, K., Grigg, N., Harman, I., Lennox, J., Magliocca, N., Parker, D.C., O'Neill, B.C., Verburg, P.H. and Young, O. (2014). Towards decision-based global land use models for improved understanding of the Earth system. *Earth System Dynamics*, **5**, 117-137
- Schulp, C.J.E., Lautenbach, S. & Verburg, P.H. 2014. Quantifying and mapping ecosystem services: Demand and supply of pollination in the European Union. Ecological Indicators 36: 131-141. http://dx.doi.org/ 10.1016/j.ecolind.2013.07.014
- Stürck, J., Poortinga, A. & Verburg, P.H. 2014. Mapping ecosystem services: The supply and demand of flood regulation services in Europe. *Ecological Indicators,* 38 (0):198-211. http://dx.doi.org/10.1016/j.ecolind.2013.11.010

- Van Teeffelen, A.J.A., Opdam, P., Wätzold, F., Hartig, F., Drechsler, M., Johst, K., Vos, C.C., Wissel, S. & Quétier, F. 2014. Ecological and economic conditions and associated institutional challenges for conservation banking in dynamic landscapes. *Landscape and Urban Planning,* in press.

Peer-reviewed Journal Papers submitted

- Castro, A.J., Verburg, P.H., Martín-López, B., Garcia-Llorente, M., Vaughn, C.C., Cabello, J. & López, E. Ecosystem service trade-offs from supply to social demand: a landscape-scale spatial analysis. *Landscape and Urban Planning* (submitted).
- Collier, M. "Novel ecosystems and the emergence of cultural ecosystem services". *Ecosystem Services* (submitted).
- Colloff, M.J., Lavorel, S., Overton, I.C., Wise, R.M., Dunlop, M., Williams, K.J. & Crossman, N.D. Adaptation services of floodplains and wetlands under climate change. *Journal of Applied Ecology*. (submitted)
- Mazarrasa I., Marbà, N., Lovelock, C.E., Serrano, O., Lavery, P., Fourqurean, J.W., Kennedy, H., Mateo, H.A., Krause-Jensen, D., Steven, A.D.L. & Duarte, C.M. Seagrass meadows as a globally significant carbonate reservoir. *Global Biogeochemical Cycles*. (submitted).
- Marbà N., A. Arias-Ortiz, P. Masqué, G. A. Kendrick, I. Mazarrasa, G.R. Bastyan, J. Garcia-Orellana, C.M. Duarte. Impact of seagrass loss and subsequent re-vegetation on carbon sinks and stocks. *Ecology Letters*. (submitted).
- Mouchet, M., Lamarque, P., Martin Lopez, B., Gos, P., Byczek, C. & Lavorel, S. An interdisciplinary methodological guide for quantifying associations between ecosystem services. *Global Environmental Change* (in revision).
- Pugh, T.A.M., Olin, S., Lindeskog, M. & Arneth, A. On the optimisation of global ecosystem service provision: comparing carbon storage, biodiversity and crop yields. *Global Environmental Change* (in revision).
- Scholte, S., Van Teeffelen, A.J.A. & Verburg, P.H. Integrating socio-cultural perspectives into ecosystem service valuation: a review of concepts and methodologies. *Ecological Economics* (in review).
- Schulp, Burkhard, Maes, Van Vliet & Verburg. Uncertainties in ecosystem service maps: a comparison on the European scale. *PLoS One* (in review).
- Schulp, C.J.E., Thuiller, W., Verburg, P.H. Wild food in Europe: a synthesis of knowledge and data of terrestrial wild food as an ecosystem service. *Ecological economics* (conditionally accepted).
- Van Teeffelen, A.J.A., Meller, L., Van Minnen, J., Vermaat, J., Cabeza, M. How climate proof is the European Union's biodiversity policy? *Regional Environmental Change* (in review).
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Table 7 Work Package Person Months per Partner

		WP1 PROJECT MANAGEMENT		WP2 PRACTICE		WP3 KNOWLEDGE		WP4 INSTRUMENTS		WP5 RESOURCE HUB		WP6 OUTREACH & DISSEMINATION		
		PERSON MONTHS		PERSON MONTHS		PERSON MONTHS		PERSON MONTHS		PERSON MONTHS		PERSON MONTHS		
PARTICIPANT NAME		FIRST PERIOD	PROJECT TOTAL	FIRST PERIOD	PROJECT TOTAL	FIRST PERIOD	PROJECT TOTAL	FIRST PERIOD	PROJECT TOTAL	FIRST PERIOD	PROJECT TOTAL	FIRST PERIOD	PROJECT TOTAL	participant total
1	UEDIN	19.025	44.00	0.475	41.00				21.00	0.675	15.00	0.675	12.00	20.850
2	VU-IVM	0.30	4.00	2.50	15.00	25.00	62.00	0.50	6.00					28.30
3	KIT	1.50	4.00	5.00	9.00	10.50	44.00							17.00
4	UFZ			0.00	10.00	0.00	6.00			0.00	2.00			0.00
5	ULUND		4.00	4.87	15.00	6.60	14.00	5.51	20.00	0.31	5.00		4.00	17.29
6	EFI	1.71	4.00					5.67	53.00	0.00	5.00			7.38
7	PROSPEX									8.78	20.00			8.78
8	WCMC	1.29	4.00					10.34	23.00	4.66	12.00		12.00	16.29
9	TIAMASG							12.00	16.00	7.00	25.00	0.00	12.00	19.00
10	IEEP					12.99	21.00	19.58	24.00	0.33	3.00			32.90
11	UCD			0.90	9.00	15.40	27.00	0.00	3.00					16.30
12	CNRS			15.56	32.00	5.28	34.00					0.30	9.00	21.14
13	UP	0.00	1.00	12.30	33.00	6.75	11.00	0.00	6.00					19.05
14	ETH			0.00	5.00	0.00	9.00	16.58	38.00			0.00	5.00	16.58
15	WWF Bulgaria			5.13	15.00	2.74	5.00	2.74	14.00			1.00	10.00	11.610
16	WWF Romania			0.70	5.00							0.00	3.00	0.70
17	SGM			4.00	12.00									4.00
18	FFCUL			0.00	12.00									0.00
19	ECM							1.275	6.00	0.50	7.00			1.775
20	BIOTOPE							5.38	29.00					5.38
21	IODINE							3.63	10.00					3.626
22	DENKSTATT			1.58	2.00			4.73	24.00	0.00	3.00			6.30
23	CIFOR			1.22	10.00			1.22	3.00		2.00			2.44
24	CSIC			2.25	13.00	2.25	6.00							4.50
25	UEA					1.27	12.00							1.270
26	ALU			4.00	14.00			1.00	6.00	0.00	3.00			5.00
27	UBO			7.95	20.00	2.70	6.00	1.25	6.00	0.00	3.00			11.90
	Total Months	23.825	65	68.43	272.00	91.48	257.00	91.40	308.00	22.26	105.00	1.98	67.00	299.361