SEVENTH FRAMEWORK PROGRAMME

THEME [ENV.2012.6.2-1]

[Exploration of the operational potential of the concepts of ecosystem services and natural capital to systematically inform sustainable land, water and urban management]

Grant agreement for: Collaborative project

Annex I - "Description of Work"

Project acronym: OPERAs Project full title: " Operational Potential of Ecosystem Research Applications " Grant agreement no: 308393 Version date: 2017-04-17

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A1: Project summary

Project Number ¹	308393	Project Acronym ²		OPERAs						
		One form	per pro	oject						
		General ir	nforma	tion						
Project title ³	Operatio	nal Potential of Eco	syster	n Research Applicatior	าร					
Starting date ⁴	01/12/20)1/12/2012								
Duration in months ⁵	60									
Call (part) identifier 6	FP7-EN	√-2012-two-stage								
Activity code(s) most relevant to your topic ⁷	ENV.201 Exploration concepts services capital to inform su land, wa manager	ENV.2012.6.2-1: Exploration of the operational potential of the concepts of ecosystem services and natural capital to systematically nform sustainable and, water and urban management								
		Abst	ract ⁹							
Human use and exploitati of major ecosystems is th existence of humanity. Re of ecosystem services (E understanding of planetar relationship between peo OF ECOSYSTEMS RESE human well-being in differ related to different ecosys whether, how and under v practical implementation i (systematic review) of exi options and instruments. in exemplar case studies Throughout this iterative p web-based portal that will perspectives on the devel Hub will provide the main practice that will benefit fr	Abstract ⁹ Human use and exploitation of the biosphere is increasing at such a pace and scale that the sustainability of major ecosystems is threatened, and may not be able to continue to function in ways that are vital to the existence of humanity. Re-framing environmental resource use has led to the emergence of the concepts of ecosystem services (ES) and natural capital (NC). This discourse indicates not only a change in our understanding of planetary functions at the ecosystem scale, but also a fundamental shift in how we perceive the relationship between people and the ecosystems on which they depend. OPERAS (OPERATIONAL POTENTIAL OF ECOSYSTEMS RESEARCH APPLICATIONS) aims to improve understanding of how 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. OPERAs will use a meta-analysis (systematic review) of existing ES/NC practice to identify knowledge gaps and requirements for new policy options and instruments. New insights, and improved or novel tools and instruments, will be tested in practice in exemplar case studies in a range of socio-ecological systems across locales, sectors, scales and time. Throughout this iterative process, available resources and tools will be brought together in a 'Resource Hub', a web-based portal that will be co-developed by scientists and practitioners representing different interests and perspectives on the development, communication and implementation of the ES/NC concepts. The Resource Hub will provide the main interface between OPERAs and a 'Community of Excellence' (CoE) for continued									

A2: List of Beneficiaries

Project Nu	umber ¹	308393	Project Acronym ²		OPERAs			
			List of Benefi	ciaries				
No	Name			Short name		Country	Project entry month ¹⁰	Project exit month
1	THE UNIVERSITY OF	EDINBURGH		UEDIN		United Kingdom	1	60
2	STICHTING VU			VU-IVM		Netherlands	1	60
3	Karlsruher Institut fuer	r Technologie		KIT		Germany	1	60
4	HELMHOLTZ-ZENTR	UM FUER UMWELTFORSCHUN	G GMBH - UFZ	UFZ		Germany	1	60
5	LUNDS UNIVERSITE	Т		ULUND		Sweden	1	60
6	EUROPEAN FOREST	T INSTITUTE		EFI		Finland	1	60
7	PROSPEX BVBA			Prospex		Belgium	1	60
8	WCMC LBG		WCMC		United Kingdom	1	60	
9	FUNDATIA PENTRU MEDIU,AGRICULTUF	TIAMASG		Romania	1	60		
10	INSTITUTE FOR EUF	ROPEAN ENVIRONMENTAL POL	CY, LONDON	IEEP		United Kingdom	1	60
11	UNIVERSITY COLLE DUBLIN	GE DUBLIN, NATIONAL UNIVER	SITY OF IRELAND,	UCD		Ireland	1	60
12	CENTRE NATIONAL	DE LA RECHERCHE SCIENTIFIC	QUE CNRS	CNRS		France	1	60
13	UNIVERSITAET POT	SDAM		UP		Germany	1	60
14	EIDGENOESSISCHE	TECHNISCHE HOCHSCHULE Z	UERICH	ETH		Switzerland	1	60
15	SDRUZHIE VVF - SV DUNAVSKO-KARPAT	ETOVEN FOND ZA DIVATA PRIR ISKA PROGRAMA BULGARIA	ODA,	WWF Bulga	ria	Bulgaria	1	60
16	ASOCIATIA WWF PR	OGRAMUL DUNARE CARPATI F	OMANIA	WWF Roma	inia	Romania	1	60
17	CONSULTORA DE S	ERVICIOS GLOBALES MEDIOAM	IBIENTALES SL	SGM		Spain	1	60
18	FUNDACAO DA FAC LISBOA FP	ERSIDADE DE	FFCUL		Portugal	1	60	
19	ECOMETRICA LIMIT	ED		ECM		United Kingdom	1	60
20	BIOTOPE SARL			BIOTOPE		France	1	60

A2: List of Beneficiaries

No	Name	Short name	Country	Project entry month ¹⁰	Project exit month
21	IODINE SPRL	IODINE	Belgium	1	60
22	denkstatt Bulgaria OOD	Denkstatt	Bulgaria	1	60
23	Center for International Forestry Research	CIFOR	Indonesia	1	60
24	AGENCIA ESTATAL CONSEJO SUPERIOR DE INVESTIGACIONES CIENTIFICAS	CSIC	Spain	1	60
25	UNIVERSITY OF EAST ANGLIA	UEA	United Kingdom	1	33
26	ALBERT-LUDWIGS-UNIVERSITAET FREIBURG	ALU	Germany	1	60
27	RHEINISCHE FRIEDRICH-WILHELMS-UNIVERSITAT BONN	UBO	Germany	1	60
28	THE UNIVERSITY OF EXETER	UNEXE	United Kingdom	34	60
29	OPPLA EEIG	OPPLA	Netherlands	51	60

A3: Budget Breakdown

Project Number ¹	08393			Project Acronym ²	² OPERAs					
				One Form	per Project					
		1						0		
Participant	Porticipant	Eund		Est	imated eligible cos	sts (whole durat	ion of the proje	ct)	Requested	
number in this project ¹¹	short name	% ¹²	Ind. costs ¹	3 RTD / Innovation (A)	Demonstration (B)	Management (C)	Other (D)	Total A+B+C+D	EU contribution	
1	UEDIN	75.0	S	853,918.00	0.00	483,096.00	361,208.00	1,698,222.00	1,484,742.50	
2	VU-IVM	75.0	Т	1,111,480.00	0.00	60,640.00	0.00	1,172,120.00	894,250.00	
3	КІТ	75.0	A	604,300.00	0.00	50,500.00	0.00	654,800.00	503,439.00	
4	UFZ	75.0	S	196,606.00	0.00	0.00	0.00	196,606.00	147,454.50	
5	ULUND	75.0	Т	710,049.28	0.00	50,809.60	46,809.60	807,668.48	630,154.50	
6	EFI	75.0	S	762,990.00	0.00	56,620.00	0.00	819,610.00	628,862.00	
7	Prospex	75.0	Т	552,000.00	0.00	2,500.00	0.00	554,500.00	416,500.00	
8	WCMC	75.0	Т	425,600.00	0.00	51,140.00	275,920.00	752,660.00	646,260.00	
9	TIAMASG	75.0	Т	289,520.00	0.00	0.00	83,520.00	373,040.00	276,660.00	
10	IEEP	75.0	A	624,119.00	0.00	3,400.00	0.00	627,519.00	471,489.00	
11	UCD	75.0	Т	378,000.00	0.00	0.00	0.00	378,000.00	283,500.00	
12	CNRS	75.0	Т	580,233.60	0.00	5,700.00	73,886.40	659,820.00	514,761.00	
13	UP	75.0	Т	441,600.00	0.00	5,000.00	0.00	446,600.00	336,200.00	
14	ETH	75.0	Т	358,078.72	0.00	0.00	38,096.00	396,174.72	306,654.50	
15	WWF Bulgaria	50.0	F	83,551.20	0.00	0.00	34,368.00	117,919.20	76,143.60	
16	WWF Romania	75.0	F	26,592.00	0.00	0.00	9,895.20	36,487.20	29,839.20	
17	SGM	75.0	Т	114,681.60	0.00	0.00	0.00	114,681.60	86,011.00	
18	FFCUL	75.0	Т	95,774.40	0.00	0.00	0.00	95,774.40	71,830.00	
19	ECM	75.0	Т	130,956.80	0.00	0.00	0.00	130,956.80	98,217.60	
20	BIOTOPE	75.0	F	200,656.80	0.00	0.00	0.00	200,656.80	150,492.00	
21	IODINE	75.0	Т	122,272.00	0.00	0.00	0.00	122,272.00	91,704.00	

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A3: Budget Breakdown

Participant	Participant short name			Es	Estimated eligible costs (whole duration of the project)						
number in this project ¹¹		Fund. % ¹²	Ind. costs ¹³	RTD / Innovation (A)	Demonstration (B)	Management (C)	Other (D)	Total A+B+C+D	EU contribution		
22	Denkstatt	75.0	S	115,710.00	0.00	0.00	0.00	115,710.00	86,782.00		
23	CIFOR	75.0	S	125,470.00	0.00	0.00	0.00	125,470.00	94,102.50		
24	CSIC	75.0	A	213,900.00	0.00	0.00	0.00	213,900.00	160,425.00		
25 (TERMINATED)	UEA	75.0	Т	68,458.69	0.00	0.00	0.00	68,458.69	51,344.02		
26	ALU	75.0	Т	210,931.20	0.00	0.00	0.00	210,931.20	158,198.40		
27	UBO	75.0	Т	210,929.60	0.00	0.00	0.00	210,929.60	158,197.20		
28	UNEXE	75.0	Т	58,261.31	0.00	0.00	0.00	58,261.31	43,695.98		
29	OPPLA	50.0	F	0.00	0.00	0.00	100,000.00	100,000.00	100,000.00		
Total				9,666,640.20	0.00	769,405.60	1,023,703.20	11,459,749.00	8,997,909.50		

Note that the budget mentioned in this table is the total budget requested by the Beneficiary and linked Third Parties.

* The following funding schemes are distinguished

Collaborative Project (if a distinction is made in the call please state which type of Collaborative project is referred to: (i) Small of medium-scale focused research project, (ii) Large-scale integrating project, (iii) Project targeted to special groups such as SMEs and other smaller actors), Network of Excellence, Coordination Action, Support Action.

1. Project number

The project number has been assigned by the Commission as the unique identifier for your project, and it cannot be changed. The project number **should appear on each page of the grant agreement preparation documents** to prevent errors during its handling.

2. Project acronym

Use the project acronym as indicated in the submitted proposal. It cannot be changed, unless agreed during the negotiations. The same acronym **should appear on each page of the grant agreement preparation documents** to prevent errors during its handling.

3. Project title

Use the title (preferably no longer than 200 characters) as indicated in the submitted proposal. Minor corrections are possible if agreed during the preparation of the grant agreement.

4. Starting date

Unless a specific (fixed) starting date is duly justified and agreed upon during the preparation of the Grant Agreement, the project will start on the first day of the month following the entry info force of the Grant Agreement (NB : entry into force = signature by the Commission). Please note that if a fixed starting date is used, you will be required to provide a detailed justification on a separate note.

5. Duration

Insert the duration of the project in full months.

6. Call (part) identifier

The Call (part) identifier is the reference number given in the call or part of the call you were addressing, as indicated in the publication of the call in the Official Journal of the European Union. You have to use the identifier given by the Commission in the letter inviting to prepare the grant agreement.

7. Activity code

Select the activity code from the drop-down menu.

8. Free keywords

Use the free keywords from your original proposal; changes and additions are possible.

9. Abstract

10. The month at which the participant joined the consortium, month 1 marking the start date of the project, and all other start dates being relative to this start date.

11. The number allocated by the Consortium to the participant for this project.

12. Include the funding % for RTD/Innovation - either 50% or 75%

13. Indirect cost model

- A: Actual Costs
- S: Actual Costs Simplified Method
- T: Transitional Flat rate
- F :Flat Rate

Workplan Tables

Project number

308393

Project title

OPERAs—Operational Potential of Ecosystem Research Applications

Call (part) identifier

FP7-ENV-2012-two-stage

Funding scheme

Collaborative project

WT1 List of work packages

Project Number ¹		308393	Project Ac	cronym ²	OPERAs							
	LIST OF WORK PACKAGES (WP)											
WP Number 53	WP Title			Type of activity ⁵⁴	Lead beneficiary number ⁵⁵	Person- months ⁵⁶	Start month 57	End month 58				
WP 1	Project ma	nagement	MGT	1	65.00	1	60					
WP 2	Practice		RTD	13	265.00	1	60					
WP 3	Knowledge)		RTD	2	255.00	1	60				
WP 4	Instrument	S		RTD	6	306.00	1	60				
WP 5	Resource I	Hub	RTD	8	104.00	1	60					
WP 6	Outreach a	ind dissemination	OTHER	1	67.01	1	60					
				8	Total	1,062.01						

Project Number ¹ 3083		30839	93	Project	Acronym ²	OPERAs		
			List of De	eliverables - to	be submitted fo	r review to EC		
Delive- rable Number 61	Deliverable	Title	WP number 53	Lead benefi- ciary number	Estimated indicative person- months	Nature ⁶²	Dissemi- nation level	Delivery date 64
D1.1	Managmen of project disseminati	t on	1	1	1.00	0	со	3
D1.2	OPERAs Research Implementa Plan	ation	1	1	3.00	R	PU	6
D1.3	Updated Research Implementa Plan	ation	1	1	2.00	R	PU	18
D1.4	Updated Research Implementa Plan	ation	1	1	2.00	R	PU	36
D1.5	Updated Research Implementa Plan	ation	1	1	2.00	R	PU	54
D2.1	Description study desig Exemplars, stakeholder needs and tested tools/instru	of ın: r ments	2	13	30.00	R	PU	15
D2.2	Report on standardize metrics/ indicators fo monitoring efficiency o ES/NC bas measures	ed or the f ed	2	26	23.00	R	PU	24
D2.3	Compilatior the reportin all exempla for further evaluation a synthesis	n of ig of irs and	2	5	170.00	R	PU	52
D2.4	Targeted synthesis: Lessons-lea from the	arned	2	1	15.00	R	PU	54

Delive- rable Number	Deliverable Title	WP number 53	Lead benefi- ciary number	Estimated indicative person- months	Nature 62	Dissemi- nation level	Delivery date 64
	meta-analysis and the Exemplars						
D2.5	Suite of decision trees to assist users to decide on ES/NC based instruments and tools	2	1	15.00	0	PU	54
D3.1	Transferable geo-referenced metrics, and GIS based quantification and valuation functions	3	12	13.00	0	PU	18
D3.2	Monetary and social valuation: state-of-the-art	3	2	20.00	R	PU	24
D3.3	Report on existing and potential governance modes for various ES/NC	3	10	13.00	R	PU	24
D3.4	Recommendation for integration of ES/NC in existing accounting and reporting formats	s 3	25	12.00	R	PU	36
D3.5	Strategies and methods for social valuation of ES/NC	3	11	26.00	0	PU	36
D3.6	A portfolio of ideal types of (public and private) governance modes for selected ES/NC	3	5	20.00	R	PU	48
D3.7	Synthesis, documentation and user guidance for new methods and the decision trees	3	2	63.00	R	PU	48

Delive- rable Number 61	Deliverable Title	WP number 53	Lead benefi- ciary number	Estimated indicative person- months	Nature 62	Dissemi- nation level	Delivery date
D4.1	Report and Policy brief on existing and emerging policy needs and opportunities	4	10	15.00	R	PU	16
D4.2	A report on lessons learned and recommendar for taking account ES/NC in key policy instruments	tions 4	10	30.00	R	PU	36
D4.3	Synthesis report documenting the operational potential of ES/NC instruments	4	6	30.00	R	PU	52
D4.4	New and enhanced existing data capture, indicator-based, and information tools incl. documentation	4	8	70.00	Р	PU	48
D4.5	Good practice guidelines for instrument choice and tutorials for instrument application	4	6	20.00	R	PU	48
D4.6	New and improved decision support tools and methods, linked with a user interface	4	14	72.00	Ρ	PU	48
D4.7	Management information tools and manuals for concept mainstreaming in three arenas	4	5	65.00	0	PU	52
D5.1	An initial Scoping	5	8	3.00	R	RE	19

Delive- rable Number	Deliverable Title	WP number 53	Lead benefi- ciary number	Estimated indicative person- months	Nature 62	Dissemi- nation level	Delivery date 64
	Document for the Common Platform						
D5.2	Demonstration version of Common Platform	5	9	20.00	D	RE	29
D5.3	Second version of the Scoping Document	5	8	3.00	R	PP	39
D5.4	A prototype of the Common Platform	5	9	20.00	Р	PU	46
D5.5	Third version of the Scoping Report	5	8	10.00	R	PP	51
D5.6	Business plan to ensure perennity	5	8	27.00	R	PU	54
D5.7	Comprehensive report on exemplar stakeholder workshops and stakeholder engagement monitoring	5	7	18.00	R	PU	58
D6.1	Dissemination strategy and plan	6	1	2.00	R	РР	12
D6.2	Short films describing issues	6	1	3.00	0	PU	18
D6.3	Policy brief Resource Hub	6	8	1.00	R	PU	32
D6.4	Short films describing resource hub and instruments	6	8	5.00	0	PU	50
D6.5	Summer School for post graduate researchers	6	12	9.00	0	PU	54
D6.6	Peer-to-Peer exchange conference	6	8	6.00	0	PU	58
			Total	859.00			

Project Number ¹	308393		Project Acronym ²	OPERAs
			One form per Work Packa	age
Work package numbe	r ⁵³	WP1	Type of activity ⁵⁴	MGT
Work package title Project ma		Project manag	jement	
Start month		1		
End month		60		
Lead beneficiary number 55		1		

Objectives

• To coordinate and administer the project according to ISO 10006 standards.

• To compose a Consortium Agreement, compile and produce periodic reports.

• To communicate with the Commission, Advisory Council and other external parties.

To review deliverables from other WPs.

Description of work and role of partners

Task 1.1. Compiling project documents (UEDIN) – To effectively start up the project, a number of documents will be prepared, including contracts, the Consortium Agreement, a detailed Research Implementation Plan.

Task 1.2. Regularly update the OPERAS Research Implementation Plan (UEDIN, VU-IVM, KIT, UFZ, ULUND, EFI, WCMC) – The Project Management Team will regularly discuss the progress of the project on the basis of the OPERAS Work Plan, and adjust the specifications where necessary. In case of inappropriate performance of one of the partners the Project Management Team (PMT) will react immediately and advise on measures to ensure proper functioning. An updated Research Implementation Plan will always be available on the OPERAS intranet.

Task1.3. Project coordination and reporting (UEDIN, VU-IVM, KIT, UFZ, ULUND, EFI, WCMC) – Throughout the project lifetime progress project will be monitored, the quality of project deliverables reviewed and financial and administrative resources managed by experienced staff. The Modular project structure and regular meetings of the PMT will ensure effective interaction between the various work packages. Project reports will be prepared every 18 months.

Task 1.4. External contacts (UEDIN, VU-IVM, KIT, UFZ, ULUND, EFI, WCMC) – This task includes the organisation and implementation of the communication with the Commission, the Advisory Council, parallel projects and other external actors, if and as appropriate.

Person-Months per Participant

Participant number ¹⁰	Participant short name ¹¹	Person-months per participant
1	UEDIN	44.00
2	VU-IVM	4.00
3	КІТ	4.00
5	ULUND	4.00
6	EFI	4.00
8	WCMC	4.00
13	UP	1.00

Person-Months per Participant

Participant number ¹⁰	Participant short name ¹¹	Person-months per participant
	Total	65.00

List of deliverables

Delive- rable Number 61	Deliverable Title	Lead benefi- ciary number	Estimated indicative person- months	Nature 62	Dissemi- nation level ⁶³	Delivery date ⁶⁴
D1.1	Managment of project dissemination	1	1.00	0	со	3
D1.2	OPERAs Research Implementation Plan	1	3.00	R	PU	6
D1.3	Updated Research Implementation Plan	1	2.00	R	PU	18
D1.4	Updated Research Implementation Plan	1	2.00	R	PU	36
D1.5	Updated Research Implementation Plan	1	2.00	R	PU	54
	^	Total	10.00			

Description of deliverables

D1.1) Managment of project dissemination: Strategy for managing project dissemination (Task 1.3). This deliverable will provide guidelines for the overall dissemination plan (D6.1), and outline how dissemination will be managed, including the development of the project website. It will thus supplement the research implementation plan, but focus on dissemination instead of research. [month 3]

D1.2) OPERAs Research Implementation Plan: OPERAs Research Implementation Plan, including a detailed list of processes and the assessment framework. The whole Project Management Team will contribute to its development. [month 6]

D1.3) Updated Research Implementation Plan: Updated Research Implementation plan, including a detailed list of processes and the assessment framework. The whole Project Management Team will contribute to its development. [month 18]

D1.4) Updated Research Implementation Plan: Updated Research Implementation plan, including a detailed list of processes and the assessment framework. The whole Project Management Team will contribute to its development. [month 36]

D1.5) Updated Research Implementation Plan: Updated Research Implementation plan, including a detailed list of processes and the assessment framework. The whole Project Management Team will contribute to its development. [month 54]

Milestone number ⁵⁹	Milestone name	Lead benefi- ciary number	Delivery date from Annex I ⁶⁰	Comments
MS1	MS1.1 Note on agreed communication procedures and quality control, mailing lists (Task 1.3)	1	3	
MS2	MS1.2 1st Consortium Assembly to evaluate progress (Task 1.3)	1	2	
MS3	MS1.3 2nd Consortium Assembly to evaluate progress (Task 1.3)	1	10	
MS4	MS1.4 3rd Consortium Assembly to evaluate progress (Task 1.3)	1	17	
MS5	MS1.5 4th Consortium Assembly to evaluate progress (Task 1.3)	1	26	
MS6	MS1.6 5th Consortium Assembly to evaluate progress (Task 1.3)	1	34	
MS7	MS1.7 6th Consortium Assembly to evaluate progress (Task 1.3)	1	42	
MS8	MS1.8 7th Consortium Assembly to evaluate progress (Task 1.3)	1	50	

Project Number ¹	308393		Project Acronym ²	O	PERAs	
				e form per Work Packa	ige	
Work package numbe	r ⁵³	WP2	ту	/pe of activity ⁵⁴		RTD
Work package title		Practice				
Start month		1				
End month		60				
Lead beneficiary number 55		13				

Objectives

· Build a consistent database from existing ES/NC case studies with a focus on operational concepts

Assess the evidence-base of current ES/NC approaches and the efficiency of instruments

· Identify knowledge gaps and the demand for instruments

• Provide input for final synthesis in T2.1

• Promote a common platform 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.

• Inform the design of, and provide test beds for, methods, tools and instruments developed in Module Instruments.

• Systematically report on the process of identifying, using, and modifying the appropriate tools and instruments within each exemplar.

• Contribute to the Resource Hub with first-hand experiences on the use of ES/NC-based methods, tools and instruments.

• 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

• Compile and synthesize lessons-learned from both the meta-analyses and the exemplars for the operationalization of tools and instruments.

• Supplement the syntheses with a suite of decision trees, allowing stakeholders and beneficiaries to decide on instruments and tools to govern and maintain ES/NC

Description of work and role of partners

Task 2.1 Meta-analysis (Task lead: ALU)

Sub task 2.1.1 Set-up of a database for characteristics of ES/NC assessments based on published case studies (ALU, EFZ, OBU, PU) – The design of the database will build on the BluePrint Protocol developed in T2.3. An initial, flexible, design will be implemented from the beginning since this will be based on the blueprint for ES/NC assessment proposed by Seppelt et al. (2012). When the T2.3 protocol becomes available the database design will be finalised.

Sub task 2.1.2 Assessment of the evidence-base for methods used in ES/NC assessments (UFZ, ALU, OBU) – Established indicators and tools from earlier studies (including those beyond the ES/NC domain) will be assessed using a consistent ranking of effectiveness based on evidence. A transparent, automated ranking system will be developed based on proven effectiveness in the scientific literature.

Sub task 2.1.3 Development of efficiency indicators for the instruments used in ES/NC assessments (UFZ, ALU, OBU) – In parallel with task 2.1.2, the efficiency of ES/NC instruments to ensure sustainable use of natural resources will be evaluated for different spatial scales, using published case studies.

Sub task 2.1.4 Conduct a meta-analysis of existing case studies (UFZ, ALU, OBU) – The meta-analysis will extend existing ES/NC databases (e.g. the TEEB database) with respect to operationalising the ES/NC concepts. The analysis will cover both the instruments used as well as the evidence based assessments and efficiency indicators described above. Face-to-face interviews with the case study researchers will be undertaken to elicit information that cannot be extracted from the literature.

Sub task 2.1.5 Knowledge gap identification based on the analysis of the database (UFZ, ALU, OBU) – Based on the meta-analysis, knowledge gaps will be identified that are used in T3.1 and T4.1 as a starting point for further assessment. Further analyses of the database together with the reported results of the exemplars (T2.2) will take place in T2.3.

Task 2.2 Exemplars – Testing ground for instruments and tools (Task lead: ULUND)

Task 2.2.1 Launch of the OPERAS cooperation, identification of stakeholder needs for different tools and instruments in each exemplar and optimisation of study design (PIK, ULUND, UEDIN, VU-IVM, KIT, UCD, CNRS, ETH, WWF Bulgaria, WWF Romania, SGM, FFCUL, CIFOR, CSIC) – Identification of stakeholder requirements for tools and instruments for ES/NC-based knowledge elicitation, decision support and management at a formal launch workshop. With T2.1 and T4.1, the stakeholders will build the constituency for tools and instruments to be developed, and specify the design of these tools/instruments for their exemplar. In order to maximise the learning experience through the application of the tools and instruments, the study design will be optimised with respect to potential cross-comparison between exemplars by testing each tool/instrument in more than one exemplar, and testing more than one tool/instrument in each exemplar.

Task 2.2.2 Regular reporting and evaluation of the process of tool and instrument testing (PIK, ULUND, UEDIN, VU-IVM, KIT, UCD, CNRS, ETH, WWF Bulgaria, WWF Romania, SGM, FFCUL, CIFOR, CSIC) – We will develop a systematic reporting plan to consistently and regularly assess progress and success of the choice, adaptation, application, and impact of specific methods, tools and instruments in each exemplar. The reporting plan will follow the BluePrint Protocol developed in T2.3, which allows joint analysis of the exemplar experiences and the meta-analysis in T2.3. Besides measurable variables, the reporting plan will also include a number of qualitative judgements, critiques, and suggestions for the practical use of ES instruments in planning and decision-making. This qualitative information will, thus, complement the findings from T2.1 Meta-Analysis in the synthesis. From Year 2, reporting will be undertaken annually in each exemplar, and the outcomes returned to a common lessons-learned database in T2.1, T2.2 and T2.3, which will ultimately feed into the Resource Hub (T5.1).

Task 2.2.3 Iterative learning processes between end-users, stakeholders, researchers, and developers of tools and instruments (PIK, ULUND, UEDIN, VU-IVM, KIT, UCD, CNRS, ETH, WWF Bulgaria, WWF Romania, SGM, FFCUL, ECM, Denkstatt, CIFOR, CSIC) – T2.2 will initiate an iterative learning process that will contribute both to academic knowledge and improved practice. This process will be supported by regular meetings between researchers and stakeholders, including the end-users of tools and instruments to be developed, in each exemplar. All stakeholders will also be invited to join the developing CoE (T5.1), and interact through social-networking facilities within the Resource Hub. The information flow between the Exemplars will be initialised in project meetings where Exemplar leads will have the opportunity to meet and discuss regularly, but will also take place using video conferencing. Exemplar stakeholders will play a central role in the OPERAS conference (T6.1), providing the opportunity for peer-to-peer learning and knowledge exchange.

Task 2.2.4 Final reporting and critical evaluation of the process as a contribution to the Resource Hub (PIK, ULUND, UEDIN, VU-IVM, KIT, UCD, CNRS, ETH, WWF Bulgaria, WWF Romania, SGM, FFCUL, CIFOR, CSIC) – T2.2 will contribute the assessment outcomes to the Resource Hub and the final Resource Hub conference. Exemplar leads and selected stakeholders will explain and critically evaluate the individual process of testing methods, tools and instruments. These exemplar-specific experiences will also contribute to the final Resource Hub conference T6.1.

Task 2.3 Practice design and synthesis (Task lead: UEDIN)

Sub task 2.3.1 Elaboration of the BluePrint Protocol (UEDIN, UFZ, ALU, OBU, VU-IVM, PIK, LUND) - A BluePrint Protocol, will be developed for both the Meta-analysis (T2.1) and the Exemplars (T2.2), thereby standardizing the comparison, evaluation and synthesis across Module Practice. The protocol will guide the meta-analysis (T2.1), provide the methodological basis for empirical data collection and information gathering in the Exemplars (T2.2), and a framework for identifying lessons learned across Module Practice (T 2.3.2). An initial review of existing ES/NC assessment protocols (e.g.(Seppelt et al., 2012, Ash et al., 2010)) will highlight key contributions as well as gaps with respect to attributes necessary to operationalise the ES/NC concepts. This will initiate the development of the BluePrint Protocol, which will be completed at the onset of the project for use in T2.1. While the structure of the protocol will remain fixed for the duration of the project, the blueprint will nevertheless enable the inclusion of additional attributes as new knowledge and insight is gained. Close interaction with the exemplars will be used to test the robustness of the protocol and to facilitate improvements.

Sub task 2.3.2 Synthesis of Lessons learned (UEDIN, UFZ, ALU, OBU, VU-IVM, PIK, LUND, VU, WCMC) - Insights from T2.1 and T2.2 will be collated within a Lessons-learned database and made accessible to the CoE via the Resource Hub. Data entry fields will enable an exhaustive description of the lessons and include a description of context, outcome, lessons identified and approaches to problem solving.

Sub task 2.3.3 Design of a suite of decision trees (UEDIN, UFZ, ALU, OBU, VU-IVM, PIK, LUND, VU, WCMC) - The lessons-learned database and the BluePrint Protocol will serve as the foundations for the construction of targeted syntheses for stakeholder groups within the CoE and beyond. These syntheses will be organized along thematic lines and research findings. Targeted syntheses arising from the Exemplars will include insights into critical knowledge gaps that result in limitations to, and uncertainties in, instrument implementation. Syntheses arising from the meta-analysis will include the provision of lessons learned for Module Instruments, identifying which instruments succeed, which fail, under which circumstances and why. Decision trees will be developed to provide contextual guidance for the selection of tools and instruments, as evidenced by the exemplars and the meta-analysis.

Person-Months per Participant

Participant number ¹⁰	Participant short name ¹¹	Person-months per participant
1	UEDIN	41.00
2	VU-IVM	15.00
3	КІТ	9.00
4	UFZ	10.00
5	ULUND	15.00
11	UCD	9.00
12	CNRS	32.00
13	UP	33.00
14	ЕТН	5.00
15	WWF Bulgaria	15.00
16	WWF Romania	5.00
17	SGM	12.00
18	FFCUL	12.00
22	Denkstatt	2.00
23	CIFOR	10.00
24	CSIC	13.00
26	ALU	14.00
27	UBO	13.00
	Total	265.00

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e- Der	Deliverable Title	Lead benefi- ciary number	Estimated indicative person- months	Nature 62	Dissemi- nation level ⁶³	Delivery date 64
	Description of study design: Exemplars, stakeholder needs and tested tools/instruments	13	30.00	R	PU	15
	Report on standardized metrics/indicators for monitoring the efficiency of ES/NC based measures	26	23.00	R	PU	24
	Compilation of the reporting of all exemplars for further evaluation and synthesis	5	170.00	R	PU	52
	Targeted synthesis: Lessons-learned from the meta-analysis and the Exemplars	1	15.00	R	PU	54

List of deliverables

Delive rable

Numb 61

D2.1

D2.2

D2.3

D2.4

D2.5

Suite of decision trees to assist

instruments and tools

users to decide on ES/NC based

Description of deliverables

Total

1

15.00

253.00

0

PU

D2.1) Description of study design: Exemplars, stakeholder needs and tested tools/instruments: D2.1 includes the detailed description, the identified stakeholder needs and the tools/instruments to be tested for each exemplars as a basis for the synthesis. Task 2.2 is responsible for D 2.1, and main beneficiaries will be Task 2.3 where the synthesis of the practical research in the Exemplars (Task 2.2) and the results of the Meta-Analysis (Task 2.1) will be synthesized. [month 15]

D2.2) Report on standardized metrics/indicators for monitoring the efficiency of ES/NC based measures: In D2.2, Task 2.1 reports on standardized techniques and metrics/indicators for monitoring and valuing the efficiency of measures in sustaining ES/NC as they are drawn from the meta-analysis. Main beneficiaries will be Task 2.2 and Task 2.3, where these results go into the further elaboration of the BluePrintProtocol. Further beneficaries are the Resource Hub (Task 5.1) and the Community of Excellence (Task 5.2). [month 24]

D2.3) Compilation of the reporting of all exemplars for further evaluation and synthesis: D2.3 compiles the on-going reporting based on the Blueprint Protocol for each Examplars into one final summary report. It will reflect the information gathered during the 5-year process in each exemplar which is fed to Task 2.3 for synthesis and to the Resource Rub (Task 5.1) as well as the Community of Excellence (Task 5.2). Task 2.2 is responsible for the D 2.3. [month 52]

D2.4) Targeted synthesis: Lessons-learned from the meta-analysis and the Exemplars: D2.4 synthesize and draws lessons-learned from the results of the meta-analysis and the experiences made in the exemplars and documented in the regular reporting. It will be the product of Task 2.3 and will directly feed into Task 5.1 and 5.2. [month 54]

D2.5) Suite of decision trees to assist users to decide on ES/NC based instruments and tools: D2.5 formalises the results of WP2 in decision trees to provide a first guideline on the possible choices for stakeholders and beneficiaries. This Deliverable will be part of the Synthesis (Task 2.3) and therefore be based on the outcome of Task 2.1 and Task 2.2. It will then be fed to the Resource Hub (Task 5.1) and other activities addressing the Community of Excellence (Task 5.2). [month 54]

Milestone number ⁵⁹	Milestone name	Lead benefi- ciary number	Delivery date from Annex I 60	Comments
MS9	MS2.1 Review of existing ES/NC assessment protocols with input from T 2.3 (DS)	26	6	2.2, 2.3
MS10	MS2.2 Draft Blue Print Protocol for systematic reporting of Exemplars and Meta Analysis	1	6	2.1, 2.2
MS11	MS2.3 Preliminary report on knowledge gaps & demand for instruments reported to WP3 & WP4 (Task 2.1)	26	8	a) Preliminary report on knowledge gaps and demand for instruments reported to WPs 3+4, gaps b) work of existing exemplars, and c) results on gaps 2.2, 2.3
MS12	MS2.4 Discuss draft BluePrint (Task 2.2)	1	12	2.1, 2.2
MS13	MS2.5 First Reporting Blue Print Protocol (1.0) revisit each 18 month reporting period)	1	12	2.1, 2.2
MS14	MS2.6Draft description of exemplars study design, stakeholder needs and tested tools/instruments	5	12	2.1, 2.3
MS15	MS2.7 Ranking of effectiveness of ES/NC based measures as valued in scientific literature (Task 2.1)	26	16	2.2, 2.3
MS16	MS2.8 Database designed to compile lessons-learned across the WP (Task 2.3)	1	30	2.1, 2.2
MS17	MS2.9 Report on Second Blue Print (2.0) revisit each 18 month reporting period	1	30	2.1, 2.2
MS18	MS2.10Interim decision trees for selecting instruments for maintaining and protecting ES	1	29	2.1, 2.2
MS19	MS2.11 Exemplars interim report	5	31	2.1, 2.3
MS20	MS2.12Workshops to elaborate iteratively lessons learned from Meta Analysis and Exemplars	1	32	2.1, 2.2
MS21	MS2.13 Report on Third Blue Print (3.0)	1	33	2.1, 2.2
MS22	MS2.14 Evaluation of processes in each exemplar with potential adaptation to the work plan	5	38	2.1, 2.3
MS23	MS2.15 Final decision trees for selecting instruments for maintaining & protecting ES/NC	1	38	2.1, 2.2
MS24	MS2.16 Decision tree workshops in collaboration with MA and EX	1	28	2.1, 2.2
MS25	MS2.17 Report on Fourth Blue Print	1	47	2.1, 2.2

Milestone number ⁵⁹	Milestone name	Lead benefi- ciary number	Delivery date from Annex I ⁶⁰	Comments
MS26	MS2.18 Contributions to the Resource Hub	1	50	2.1, 2.2
MS27	MS2.19 Final Operas Exemplar Conference	5	50	2.1, 2.3

Project Number ¹ 3083	393	Project Acronym ²	OPERA	S	
		One form per Work Pack	age		
Work package number 53	WP3	Type of activity 54	RTD		
Work package title	Knowledge				
Start month	1				
End month	60				
Lead beneficiary number 55	2				
		Objectives			
• identify synergies and cor	nflicts between E	ES provision and biodive	sity conse	ervation that relate to the	
 quantify uncertainties in s 	ecosystem tunc ervice provision	for existing ES/NC mod	el-based n	nethods and translate these into	
operational metrics					
 explore impacts on the op and/or when off-side effects 	erational potent	al of the ES/NC approa	ch when ti NC quant	me-periods of variable length	
 provide scale and context 	specific approa	ches to measure social	and cultura	al values relevant to the conditions	
in the respective Exemplars	s (T2.2)				
 provide WP4 with input or values 	n designing tools	s and instruments that ex	plicitly de	monstrate or take account of social	
 analyse the social values of different ES/NC types and address cultural services, which are often excluded from 					
traditional ES/NC quantification and valuation studies					
address fundamental problems related to the valuation of those goods and services that cannot be reliably					
addressed through moneta	ry valuation me	thods, for example the n	on-use val	ue aspects of ES/NC (with T3.2);	
develop spatially transferation studies through the	able valuation m	ethods to avoid the need	that acco	/ and time-consuming original	

• refine valuation methods into approaches for uptake by the ES/NC policy community for use in practical decision making that allows for transfer across location and scale (with T4.1-13);

• establish guidelines for the incorporation of robust market and non-market value estimates in pricing and payment schemes for ES/NC (with T4.5).

• assess appropriate mixes of governance modes for selected ES/NC and to match these with existing public and private policies for a variety of scales, jurisdictions and sectors in order to identify what combinations of governance modes are conducive to operationalise ES/NC.

• provide improved insights into the role of property rights (including user rights) to operationalise various ES/NC (Carruthers and Ariovich, 2004) by increasing our understanding of the full range of formal and informal property rights arrangements, their multifaceted interplay and how they interact with environmental policies as well as with concrete ES/NC such as water regulation, pollination, nutrient retention etc.

• assess the possibilities and options to operationalise ES/NC through improved policy integration and mainstreaming into existing policy frameworks and policy implementation (Lafferty and Hovden, 2003).

• assess the problems of incongruent scales and jurisdictions when operationalising ES/NC, including problems associated with compliance across scales and jurisdictions (Sandmo, 2002).

• develop a portfolio of (Weberian) ideal types of governance modes for selected ES/NC (Kohler-Koch and Eising, 2004) in which the role of the ideal types is to serve as a generic benchmark for assessment and refinement of public and private policies of various ES/NC.

 assess the operational potential of existing methods for the analysis of trade-offs and synergies between ES/NC

• develop an integrated method to analyze the limitations and potentials of different perspectives on the ES/NC approach (ecosystem functioning, monetary and social values)

• analyse typical synergies and conflicts arising from operational ES based management of NC comparing alternative ES quantification and valuation perspectives

Description of work and role of partners

Task 3.1 Ecosystem function and quantification (task leader: KIT)

Sub task 3.1.1 Provide operational means to link ecosystem function, biodiversity and ES provision (CNRS, UFZ, OBU, VU-IVM, CSIC) - Task 3.1.1 will exploit the most recent biodiversity (Devictor et al., 2012) and functional traits databases (Kattge et al., 2011) with biodiversity and ES/NC models (Kienast et al., 2009, Nelson et al., 2009, Thuiller et al., 2009, Verburg et al., 2009) to address how patterns of biodiversity align with those of ES/NC, and how different dimensions of biodiversity effectively contribute to ES provision. Existing databases will be coupled with ES/NC maps at different scales, including Europe (e.g. from EU FP7 VOLANTE, and some of the exemplar studies). From these relationships will be developed between biodiversity parameters and ES provision, to compare with existing biodiversity-ecosystem functioning relationships. This will identify those components of biodiversity that are critical to ES provision and highlight how biodiversity conservation affects ES provision, and vice versa. The analysis will indicate whether and where critical ES provision areas overlap, or not, with different dimensions of biodiversity

Sub task 3.1.2 Embed ecosystem processes into to the operational ES/NC domain (KIT, CNRS, VU-IVM, CSIC) – Task 3.1.2 will utilise state-of-the art, process-based modelling frameworks to account for multiple ecosystem function responses to changes in the environment, such as the terrestrial C sink strength, while considering limitations of water and nitrogen availability, effects of changing atmospheric CO2 levels on plant physiology and effects on river runoff; and accounting for ecosystem-atmosphere greenhouse gas exchanges beyond CO2(Gedney et al., 2006, Arneth et al., 2010, Zaehle et al., 2011, Bondeau et al., 2007). The process-based simulation results of ecosystem functioning will be translated into recently proposed metrics usable in ES/NC instruments (Anderson-Teixeira and DeLucia, 2011, Huntingford et al., 2011, West et al., 2011). The work will be linked to and tested in the OPERAS exemplars, from regional (i.e., Mediterranean) to continental (Europe) and global scales.

Sub task 3.1.3 Explore the temporal and spatial dimensions of the ES/NC concepts (including time lags and off-site impacts) (CNRS, KIT, VU-IVM, UFZ, OBU) – Task 3.1.3 will explore ways to represent spatial and temporal effects more explicitly by adopting and improving the quantification methods developed in Task 3.1.3. ES delivery has strong spatial and temporal dynamics (Perrings et al., 2010), and a value associated with an ES might change considerably, depending on whether an annual or decadal perspective is considered (Anderson-Teixeira and DeLucia, 2011). Specific simulation sensitivity studies will be designed to test how measures of the multiple ES (from 3.1..2) can have different values depending on the time-scale considered (e.g. a few years to a few decades) and to analyse the effects of management elsewhere (e.g. how land use change and altered runoff might affect the coast, or how indirect land use change caused by bioenergy production might affect ES/NC).

Sub taks 3.1.4 Methods and metrics to assess uncertainty in ES/NC quantification (VU-IVM, KIT, CNRS) – Task 3.1.4. will consider probabilities or uncertainties of outcomes in support of decision-making and risk assessments. Work will test and select from approaches developed in the climate change and ecosystem modelling communities, such as parameter perturbation analysis (Booth et al., 2011), latin hypercube sampling (Zaehle et al., 2005), systematic data-assimilation into models (Ziehn et al. 2011) and model ensembles (Schaphoff et al., 2006, Zaehle et al., 2005, Scholze et al., 2006, Buisson et al., 2009). This task will assess how such methods can best translate new inforamtion into metrics that are used in trade-off analysis (T3.6), and in the further development of information and decision making tools (T4.1 and T4.2).

Task 3.2 Social and cultural values of ES/NC (task leader: UCD)

Sub task 3.2.1 Developing and testing methods for social valuation of ES/NC (UCD, VU-IVM, UP) - This task will ascribe social value constructs to ES/NC that the meta-analysis and other WPs identify as being of high societal importance or for which social values have yet to be adequately explained. In particular, this is likely to include regulating and cultural services that are on the periphery of what we can quantify exclusively, or to a meaningful extent, with standard economic methods. The task will define underlying social values and measure how they diverge from economic notions of utility maximisation. This includes motivations based on perceptions of the collective good rather than the individual benefits (Gowdy and Erikson, 2005). This task examines the motivation of security of livelihoods, for example of yields, income or employment, and of well-being and health with regard to food quality, water quality, disease/pandemics and protection from adverse environmental or climatic events, such as floods / droughts. Alternative social valuation methods will be tested under varying contexts and spatial scales in the exemplar studies. Social valuation methods may range from crowd-sourcing at European and global scales to participatory methods and social surveys within the smaller exemplars.

Sub task 3.2.2 Assessing the spatial distribution of ES/NC and social values (VU-IVM, UCD, UP, WWF-Bulgaria) - The social valuation will also examine the spatial scale and distribution of values and the relationship between stakeholders identifying the social distribution of beneficiaries. Particular issues evolve from the relationship between individual and societal needs and preferences. Social values will depend on the distribution of use rights and access to resources, including distinctions between private and common property regimes. Externalities, both positive and negative, will result where the values of one stakeholder are not taken into account by others. There are issues too where environmental regulation may be perceived as interference in established management regimes.

Sub task 3.2.3 Exploring the potential for alternative multidimensional valuation methods (UP, UCD, VU-IVM) - An interchange of information will occur with T3.3 and T3.4. Externalities, user and property rights have habitually been explored with utilitarian approaches such as those to be examined in T3.3 and represent the fundamental material for the analysis of institutional structures in T3.4. T3.2 will therefore explore the potential for alternative multidimensional valuation methods for ES/NC where economic techniques alone are deficient, and will demonstrate how existing market and non-market valuation can take fuller account of social needs and values. T3.2 will coordinate with these work packages to input to those exemplar studies where social and distributional issues are of particular relevance and to inform WP 4.

T3.2 will explore and quantify the role of social values and social capital so as to strengthen the potential for EU Directives to be effectively implemented with broad public support. To advance this, the WP will input to tools development within WP 4 and to the analysis of the context for the application of tools within WP 2. This output can be aligned within the Resource Hub to the needs of planners, managers, resource extractors and policy makers.

Task 3.3 Market and non-market valuation of ES/NC (task leader: VU-IVM)

Sub task 3.3.1 Critical review and development of an economic valuation framework for effective ES/NC policy (UNEXE, VU-IVM, IEEP, UCD) - While there has been considerable work on developing methods for the monetary valuation of non-market environmental goods, their application to certain aspects of ES/NC remains contentious, especially with respect to the assessment of non-use (existence) value aspects of ES provision. Moreover, the incorporation of ES values into national accounts and reporting has been limited. Given the targets set out, for example, in the EU Roadmap to a Resource Efficient Europe, the EU 2020 Biodiversity Strategy, and the New Strategic Plan of the CBD to assess the state and economic value of ecosystems, there is a need to develop a common practical framework for MS to achieve this. Such a framework would draw ideally on existing initiatives and share best practices across MS. This task addresses the objective to formulate guidance for ES/NC assessment that combines and makes best use of existing approaches. It will develop a common practical framework and recommendations for each step in the assessment-valuation-accounting process. In doing so, this task addresses a number of challenges: 1. The results of existing initiatives cannot necessarily be directly combined to form a coherent EU level assessment. Differences in definitions and approaches may prohibit valid comparison and aggregation of results; 2. The scaling-up of ES/NC values across MS without accounting for European scale changes in service provision may under- or overestimate values if key driving factors behind the generation of these economic values are not properly accounted for; 3. Linkages between each step in the process need to be consistent and complementary.

Sub task 3.3.2 Meta-analysis of economic values related to ES/NC and development of spatial transfer functions (VU-IVM, UNEXE) - Building on existing meta-databases of valuation studies, many of which have been developed over the past decade by the OPERAS partners, T3.3 will apply recently developed spatially explicit integrated modelling and valuation techniques. Advanced meta-analyses will be undertaken, employing contemporary analytical techniques to address the shortcomings of previous analyses (e.g. (Bateman et al., 2011, Brander et al., 2012). T3.3 will generate an integrated value transfer model of land use, spatially linking bio-physical measures from T3.1 with existing economic and social data to derive spatially explicit (i.e. GIS based) economic (market and non-market based) value functions. The reliability and robustness of these value functions will be tested in the Exemplars for different ecosystems and ES/NC, but will also be compared with existing valuation tools such as the Natural Capital project tool InVEST. The results will be used to further calibrate and validate the GIS based value transfer functions.

Sub task 3.3.3 Integration of market and non-market ES/NC values in existing accounting frameworks (IEEP, VU-IVM) - Key challenges to linking economic market and non-market values for ES and NC to existing accounting and reporting activities such as SEEA and their European counterpart NAMEA include: (i) the provision of a consistent framework of economic value indicators at the national, EU and global level, and (ii) improvement of data availability, particularly by developing methods that provide time series. Interlinkages

between different pressures on ES and their associated physical and economic impacts on NC and resource scarcity need to be considered. A framework will therefore be developed that has the capacity to link new knowledge to courses of action so as to provide relevant indicators that can be implemented by EU policy makers and relevant stakeholders such as Eurostat and the EEA. Linking this framework to the experimental EEA (2012) framework and the Ecosystem Service Partnership (ESP) blueprint (Seppelt et al., 2012)) will provide a consistent approach. By working with existing accounting and reporting frameworks, the framework will be available to evaluate the contribution of ES/NC to wider wealth and welfare accounting considerations as is the case for existing integrated national accounting frameworks such as the UN's SEEA and the World Bank's Wealth Accounting and Valuing Ecosystem Services (WAVES). Recommendations for accounting and reporting ES values in existing accounting frameworks will draw on best practices identified in Task 3.3.1 and 3.3.2, as well as on the scientific literature.

Sub task 3.3.4 Translation of economic value estimates into payments for ES/NC (VU-IVM, IEEP, UNEXE, UCD) Although values and prices are closely related, the link between market and non-market valuation to actual pricing and payment schemes remains largely underdeveloped. The role of market and non-market valuation in price setting and other payment schemes such as compensatory mechanisms in Payments for Ecosystem Services (PES) will be further elaborated in Task 3.3.4. The work will build on recent local, national and global overviews of institutional-economic terms and conditions determining the success of existing PES schemes (Brouwer et al., 2011). Existing incentive schemes in the Exemplars and at wider the European level (e.g. agri-environmental schemes) will be critically reviewed and directly related to the market and non-market values for ES/NC addressed in the previous Tasks 3.3.1, 3.3.2 and 3.3.3. Special attention will be paid to the cost-efficiency of policy mixes (the literature on which is very limited) and to the interaction between legal (regulatory) and financial (market-based) instruments, resulting in a mix of policy instruments. The work in this task relates closely to existing EU initiatives, such as the FP7 project POLICYMIX in which the role of economic instruments in policy mixes for biodiversity conservation and ES provision are analyzed. The review and analysis in the Exemplars will result in practical policy recommendations for modifications and improvements to existing incentive schemes.

Task 3.4 Institutional structure and governance systems (task leader: ULUND)

Sub task 3.4.1 Compilation of a comprehensive typology of governance modes for selected ES/NC (ULUND, IEEP) - We identify three main modes of governance: marketization, democratization, and regulation (Jerneck et al., 2010). Normally governance initiatives involve mixes of all three, but the balance between them varies depending on the ecological characteristics of the ES/NC as well as the societal context. The guiding research question concerns which mixes of governance modes (marketisation/democratisation/regulation) are appropriate for specific ES/NC depending on the nature of their ecosystem functioning. This involves a comprehensive literature survey and a meta-analysis of a number of empirical cases in order to provide a comprehensive typology of how various ES/NC may be harnessed in an optimal way. It also involves the mapping of existing governance instruments into the typology. Gaps and shortcomings will be identified both in terms of scientific knowledge at the interface of the social and natural sciences and in terms of policy instruments. The typology will be tested and used in the exemplars in T2.2. Information on the gaps and shortcomings in the framework of policy instruments will be derived from the analysis under T4.1.

Sub task 3.4.2 Analysis of the role of property rights for policies on ES/NC (ULUND, IEEP)

The guiding research question concerns what role formal and informal property rights (PR) play in governing ES/NC and how they can be further developed in order to better handle ES/NC management. PR arrangements are highly contextual and have a decisive impact on resource distribution, economic performance and (in)equality in local settings, but they are also important at national, regional and global geopolitical scales. Five main clusters of questions will be addressed in the contexts of the exemplars: 1) what can be owned, 2) who can own it, 3) what can be done with it, 4) how are the rights maintained, 5) how can property move between different owners? The task will scrutinise legal definitions of PR compared with norms and attitudes among key stakeholders in the contexts of the exemplars in T2.2. Results will be used to expound the definitions of formal PRs in order to operationalise ES/NC in WP4.

Sub task 3.4.3 Analysis of current and potential policy integration to operationalise ES/NC (IEEP, ULUND) -The guiding research question concerns the possibilities for further policy integration and mainstreaming of the ES/NC approach given existing governance, institutional structures and practices. New governance instruments for ES/NC must co-exist with existing practices and modes of policy implementation. In some cases, policy integration and mainstreaming may be an appropriate approach, in others there is a need for more profound innovations of new practices and modes of implementation. The research will synthesise existing literature and

policy documents as well as providing more profound insights from the exemplars in WP 2. The trade-offs and synergies of different directives across a range of ES/NC will be assessed and policy conflicts and synergies will be identified. The results of the exemplar studies will feed into the more structured analysis of this task. Given the interlinkages, this Task will be carried out in close cooperation with the assessment of operational potential, needs and demands for ES/NC concepts (T4.1).

Sub task 3.4.4 Analysis of cross scale/jurisdiction issues for the development and implementation of policies for ES/NC (ULUND, IEEP) - The guiding research question concerns how scale and jurisdiction issues (including specific policy styles) affect the possibilities for successful implementation of public and private policies. ES may provide benefits at one scale or jurisdiction while the associated NC need to be protected or developed at another. Specific jurisdictions may have location-specific knowledge and practices about how to address ES/NC issues. Compliance mechanisms associated with cross scale/jurisdiction issues will be investigated. Research will assess and synthesise the current literature as well as engage closely with the exemplars. The results will provide important inputs to the design of new instruments (T4.1-4.5).

Task 3.5 Trade-offs and synergies in ES/NC and alternative valuation perspectives (task leader: VU-IVM) Sub task 3.5.1 Guide knowledge developments and communicate across WPs (VU-IVM, KIT) - Task 3.5.1 will: 1) coordinate the iterative knowledge transfer across WP3, and 2) provide appropriate platforms to incorporate knowledge into instrument development and testing in WPs Instruments and Practice. WP Knowledge activities will be organized in a flexible way to be responsive to emerging knowledge needs from WP Practice (through the meta-analysis and exemplar experience) and ongoing developments in Instruments. Given the life-time of the project such an approach is necessary to incorporate developments both inside and outside the consortium in a rapidly developing field. Half-yearly Knowledge WP leader teleconferences will facilitate the immediate response to demands from other WPs and associated tasks, while a larger re-orientation is possible in consultation with the international Advisory Council and cross-OPERAS assessment at the project mid-point. A number of cross-WP workshops will be organized to discuss (i) the possibilities for operationalizing new knowledge through instrument development and exemplar testing (jointly with T4.5 and T2.2), (ii) a structured approach for representing new data, metrics and methods in the Resource Hub (jointly with T5.1).

Sub task 3.5.2 Assess and enhance the operational potential of methods for assessing trade-offs and synergies in ES/NC quantification (CNRS, VU-IVM, UFZ, OBU, KIT) - Building on the meta-analysis of T2.1 we will assess to what extent recent methods for trade-off analysis (Nelson et al. 2009;Raudsepp-Hearne et al. 2010;Gos and Lavorel 2012) have generic applicability and can incorporate advances in the quantification of ES/NC made in T3.1. Trade-offs can occur with substantial time-lags or operate over large distances (leading to inter-regional to global teleconnections/spatial spill-over), and the analysis of such trade-offs should account for these spatial and temporal dimensions. In consultation with WP Instruments the potential to operationalise the concept of trade-offs and synergies will be analyzed, and existing trade-off analysis methods enhanced and developed that are tailored towards the operational instruments.

Sub task 3.5.3 Novel assessment methods reconciling the functional, monetary and social values of ES/NC (VU-IVM, KIT, CNRS-LECA, ETH, UCD) - We will synthesize the strengths and weaknesses of the alternative perspectives (T3.1-8) to operationalie the ES/NC approach. Based on the conceptual and causal linkages between biodiversity, ecosystem functioning, monetary and social values the differences in the operational potential of the different perspectives will be analyzed. We will develop a decision tree (and associated arguments) for the applicability of the different perspectives for inclusion in the 'Resource Hub' that fits within social and institutional structures and governance. Assessments of the monetary costs of optimizing the social value of ES provision, or of short-term effects of ecosystem management decisions on monetary or social value will be compared to those considering long term functioning of the ecosystem. The approach will analyze the conflicts and convergence of social, monetary and ecosystem based perspectives for ES provisioning. The new methods will be developed and tested alongside the OPERAS exemplars to test their applicability and will feed the development of information and decision support instruments in T4.3.

Sub task 3.5.4 Analysis of patterns of synergies and trade-offs across exemplars (KIT, CNRS, VU-IVM, UCD) - Using a consistent methodology across selected exemplars (global scale, European, and some local case studies) where provision of multiple ES is addressed, two types of experiments will be conducted to identify, empirically, both context-specific as well as generic patterns of trade-offs and synergies: 1) Simulation experiments to investigate the effects of the implementation of different management (T4.4) on emerging trade-offs and synergies for the functioning of ecosystems and between social, economic and ecological values arising from this. Results will feed into T4.5 to foster the assessment of strengths and weaknesses of the different instruments; 2) optimisation of ES/NC management under constraints (using tools such as Marxan

(http://www.uq.edu.au/marxan) for either ecological, social or economic objectives (or combinations of these). Results will be synthesized in cooperation with T2.3 (adding to the 'lessons-learned' database). These insights are also (iteratively) used to inform the development of information and decision support instruments (T4.2-T4.3), and made available to the CoE through the Resource Hub.

Person-Months per Participant

Participant number ¹⁰	Participant short name ¹¹	Person-months per participant
2	VU-IVM	62.00
3	КІТ	44.00
4	UFZ	6.00
5	ULUND	19.40
10	IEEP	21.00
11	UCD	27.00
12	CNRS	34.00
13	UP	11.00
14	ЕТН	3.60
15	WWF Bulgaria	5.00
24	CSIC	6.00
25	UEA	7.50
27	UBO	4.00
28	UNEXE	4.50
	Total	255.00

List of deliverables

Delive- rable Number	Deliverable Title	Lead benefi- ciary number	Estimated indicative person- months	Nature ⁶²	Dissemi- nation level ⁶³	Delivery date ⁶⁴
D3.1	Transferable geo-referenced metrics, and GIS based quantification and valuation functions	12	13.00	0	PU	18
D3.2	Monetary and social valuation: state-of-the-art	2	20.00	R	PU	24
D3.3	Report on existing and potential governance modes for various ES/NC	10	13.00	R	PU	24
D3.4	Recommendations for integration of ES/NC in existing accounting and reporting formats	25	12.00	R	PU	36
D3.5	Strategies and methods for social valuation of ES/NC	11	26.00	0	PU	36

List of deliverables

Delive- rable Number	Deliverable Title	Lead benefi- ciary number	Estimated indicative person- months	Nature 62	ture ⁶² Dissemi- nation Delive level ⁶³	
D3.6	A portfolio of ideal types of (public and private) governance modes for selected ES/NC	5	20.00	R	PU	48
D3.7	Synthesis, documentation and user guidance for new methods and the decision trees	2	63.00	R	PU	48
<u></u>	*	Total	167.00			μ

Description of deliverables

D3.1) Transferable geo-referenced metrics, and GIS based quantification and valuation functions: Initial set of transferable geo-referenced metrics, and GIS based quantification and valuation functions for ES/NC (contributing groups: Task 3.1) [month 18]

D3.2) Monetary and social valuation: state-of-the-art: Report on social and cultural valuation state-of-the-art, its relevance, application, distributional aspects and relevant tools (contributing groups: Task 3.2, 3.3) [month 24]

D3.3) Report on existing and potential governance modes for various ES/NC: Report on existing and potential governance modes for various ES/NC, including a typology of appropriate governance modes, an analysis of major gaps in scientific knowledge and policy instruments, the role of property rights and options for policy integration and mainstreaming (contributing groups: Task 3.4) [month 24]

D3.4) Recommendations for integration of ES/NC in existing accounting and reporting formats: Recommendations for integration of ES/NC in existing accounting and reporting formats at national & EU level and guidelines for the translation of market and non-market values into PES (contributing groups:Task 3.3). Include Recommendations for integration of ES/NC in existing accounting and reporting formats at national & EU level and guidelines for the translation of market and non-market values into payments for ecosystem services [month 36]

D3.5) Strategies and methods for social valuation of ES/NC: Strategies and methods for social valuation of ES/NC including new tools and/or modifications to existing tools (Task 3.2) [month 36]

D3.6) A portfolio of ideal types of (public and private) governance modes for selected ES/NC: A portfolio of ideal types of (public and private) governance modes for selected ES/NC as well as deviations based on worked examples from the exemplars (contributing groups: task 3.4) [month 48]

D3.7) Synthesis, documentation and user guidance for new methods and the decision trees: Synthesis, documentation and user guidance for new methods and the decision trees that are made available through the resource hub (contributing groups: Task 3.5). Jointly led by VU-IVM and KIT, with input from all WP partners. [month 48]

Milestone number ⁵⁹	Milestone name	Lead benefi- ciary number	Delivery date from Annex I ⁶⁰	Comments
MS28	MS3.1 Set strategy for first applications and identify development needs, WP meeting (Task 3.1.2)	3	3	

Milestone number ⁵⁹	Milestone name	Lead benefi- ciary number	Delivery date from Annex I ⁶⁰	Comments
MS29	MS3.2 Delivery of draft conceptual framework of valuation approach (task 3.3.1)	25	6	
MS30	MS3.3Discussion paper on the design of a conceptual framework on incorporating spatial (task 3.3)	2	19	Discussion paper on the design of a conceptual framework on incorporating spatial complexity in value transfer functions
MS31	MS3.4 Discussion paper on establishing definitions. For social & cultural values & h(task 3.2)	11 16 F v r		Discussion paper on establishing definitions. For social and cultural values and how they relate to changes in the environment
MS32	MS3.5 Discussion paper:methodological/conceptual frwork for WP3 & plan application in Scot.Ex(T3.5)	2	18	Discussion paper on a full methodological/ conceptual framework for WP3 and a plan for application in the Scotland exemplar
MS33	MS3.6 Generic questions to selected exemplars re salient characteristics of ES/NC & stkholders(T3.4)	5	10	Set of generic questions sent to selected exemplars regarding salient characteristics of ES/NC and stakeholders
MS34	MS3.7 Identification of knowledge and policy gaps in the context of exemplars and instruments(T3.4)	10	18	Identification of knowledge and policy gaps in the context of exemplars and instruments
MS35	MS3.8 Summary table of exemplar needs from WP3(task 3.5)	13	18	
MS36	MS3.9 coordinated plan for the application of monetary valuation in selected exemplars (T3.3)	25	20	
MS37	MS3.10 coordinated plan for the application of social valuation in selected exemplars(T3.2)	11	32	
MS38	MS3.11teleconf/wkshop with exemplars:economic valuation in existing accounting&reportingformats(T3.3	2	30	minutes of a teleconf/workshop with exemplars to discuss recommendations for integration of spatially sensitive, transferable methodology for economic valuation

Milestone number ⁵⁹	Milestone name	Lead benefi- ciary number	Delivery date from Annex I ⁶⁰	Comments
				of ES/NC in existing accounting formats
MS39	MS3.12Draft guidelines with best practice on the use of economic valuation methods p	10	33	Draft guidelines with best practice reccomendations on the use of economic valuation methods provided to resource hub
MS40	MS3.13 paper submitted: Framework for model-based quantification of ES and their uncertainty(T3.1)	12	36	
MS41	MS3.14 First test of the portfolio of ideal types in some exemplars (T3.4)	14	36	
MS42	MS3.15 Discussion paper:trade-off analysis performed for at least 3 different exemp(input for MS3.16	12	36	
MS43	MS3.16Synthesis workshop for documentation & user guidance for new methods & the decision trees(T3.5	3	37	
MS44	MS3.17 Expanded meta-analysis database made available to Resource Hub under restricted Access(T3.3)	2	48	
MS45	MS3.18 Provide knowledge on the governance typology with guidelines to the resource hub(T3.4)	5	50	
MS46	MS3.19 publication: use of governance typology to assess existing EU/other policies for harnesing ES	5	54	
MS47	MS3.20 Final report or scientific paper of task 3.1	3	60	
MS48	MS3.21 Panel on the application of novel social valuation methods as applied in one or more exemplar	11	60	
MS49	MS3.22Paper submitted on the meta-analytic database(T3.3)	2	60	
MS50	MS3.23 Synthesis paper on Task 3.5 results	2	60	
MS51	MS3.25 Identification of policy integration needs, cross jurisdiction issues, PR arrangements	5	18	

Project Number ¹	3083	93	Project Acronym ²	0	PERAs
One form per Work Package					
Work package number	r ⁵³	WP4	Type of activity ⁵⁴		RTD
Work package title		Instruments			
Start month		1			
End month		60			
Lead beneficiary number 55		6			

Objectives

• To analyse the operational potential, needs, and demands for ES/NC concepts in policy development and implementation

o to analyse demands and potentials from both "top-down" and "bottom-up" perspectives , including in respect to policies for biodiversity conservation, sustainable use of natural resources, and environmental protection o to identify and assess sector- specific and stakeholder-specific needs for the application and integration of ES/NC into key policy instruments and their implementation

o to identify and assess opportunities for ES/NC integration in key emerging issues, including the green economy and trade sustainability

• To develop new and improved information tools that include ES/NC concepts

o to develop novel data capture tools to enhance the ES/NC data pool;

o to improve existing indicator-based information tools and develop new ones with ES/NC utility;

o to improve information tools as input to accounting and ratings systems with ES/NC relevance;

o to improve ES/NC data and information storage and presentation for improved data and information exchange.

• 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

o to secure the inter-operability of decision-support tools and methods, allowing information transfer between them;

o to develop interactive user-interfaces in improved decision support tools, such as collaborative platforms with GIS-based 3D visualizations and smart phone applications;

o to define the necessary institutional and policy frameworks to facilitate the embedding of integrated decision-support tools into actual decision-making processes.

• To develop and apply new and improved implementation management and appraisal tools and instruments to support the implementation and uptake of ES/NC concepts;

o to appraise different approaches to implementation in a range of contexts;

o 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;

o to propose scheme modifications to reduce implementation costs, enhance cost effectiveness, increase transparency, overcome obstacles, avert risks, and improve policy outcomes.

• To guide the development, choice and application of instruments that include ES/NC concepts both within and beyond the OPERAs project

o 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;

o to synthesize the potential for operational ES/NC instruments and develop a road map for application of different instruments and tools;

o to elaborate good practice guidelines for choice and application of ES/NC instruments as input to the Resource Hub (WP 5).

Description of work and role of partners

Task 4.1 Demand for ES/NC instruments (task lead: IEEP)

Sub task 4.1.1 Top down analysis: gaps and needs assessment for the integration of ES/NC concepts (IEEP, UNEP-WCMC, ETH-Zurich, Biotope, ULUND, Denkstatt, EFI (BOKU)) - This task involves a general policy audit to identify the needs of - and gaps in - the existing EU policy frameworks, based on the review of literature and policy documents and supported by stakeholder interviews at both EU and Member State level. A range of sectoral and horizontal policies identifying specific areas of opportunities for the use of ES/NC will be analysed in terms of: policy areas (e.g. regional development, agriculture, fisheries, forestry, water guality and security. climate mitigation and adaptation, poverty alleviation and development assistance, competitiveness and the bio-economy), and key strategic plans and policy documents (e.g. EU and national strategies related to sustainable use of NC and biodiversity conservation). The existing policy instruments considered will include the EU Nature Directives, Water and Marine Framework Directives, Environmental Impact Assessments and the Liability Directive, Common Agricultural Policy (CAP) and the planned EU frameworks for green infrastructure and no-net-loss of biodiversity. The analysis will be set against the background of key EU commitments related to the conservation of biodiversity, ecosystems and related services and the sustainable use of NC, e.g. the EU and global biodiversity goals to 2020, the Roadmap for Resource Efficient Europe and the EU 2020 Strategy. Particularly relevant and/or promising policy areas and instruments will be identified and selected for more in-depth exploration under Tasks 4.1.2 to 4.1.4 and further under T4.2, T4.3 and T4.4. The analysis will focus on the following aspects: overall needs and gaps regarding (i) regulatory, voluntary and market-based instruments; (ii) information tools and instruments (link to T4.2); (iii) assessment and decision-support tools (link to T4.3); (iv) schemes for implementation and uptake of instruments (link to T4.4).

Sub task 4.1.2 Bottom up analysis: demands and needs for ES/NC instruments by key stakeholders (ALU, OBU, IEEP, Denkstatt, PU, WWF, Biotope) - This task assesses the demands and needs from the perspective of key stakeholders. The work will include stakeholder interviews supported by assessment of existing and potential instruments (building on Task 4.1.1 above and T2.1) and explore tools and instruments with the greatest potential for ES/NC integration. Stakeholder groups addressed include: (i) public stakeholders – e.g. city administrators (procurement, planning and investment departments) as well as permitting authorities, inspectorates and law courts; (ii) private - e.g. regional business, such as rating agencies, insurance companies, ethical investment funds and auditors as well as business stakeholder groups (e.g. agriculture, forestry); (iii) academia and other professions – e.g. evaluation communities; and (iv) communities (e.g. fishing communities) and citizens (e.g. via NGOs). Based on existing knowledge and established contacts, different partners will be responsible for different stakeholder groups.

Sub task 4.1.3 Identifying and assessing emerging issues and the opportunities for ES/NC integration (IEEP, Biotope, Denkstatt, EFI(BOKU)) - Based on the analysis of the results of Task 4.1.1 and 4.1.2, a range of key emerging issues will be identified, e.g. Green Economy, Bio-based Economy and Trade Sustainability/product supply chains, the permitting process and environmental liability issues. For each of these the scope and benefits of integrating ES/NC will be synthesised.

Sub task 4.1.4 Analysis of needs for ES/NC in the context of specific policy tools and their implementation. (IEEP, ALU, OBU, Denkstatt, EFI(BOKU), WWF) - This task looks in depth at the opportunities for ES/NC integration in key policy instruments for their design, launch and implementation. It aims to assess how and where ES/NC integration could be done, who would be involved and what information on ES/NC and other tools would be needed for such integration. Following results of Task 4.1.1, specific instruments will be selected for an in-depth analysis, based on the needs for such instruments and the opportunities for impact by those instruments, integrating the insights from/needs for the Exemplars in T2.2. Tools and instruments considered will include PES (inc. REDD+), natural capital accounts, environmental and economic accounts (SEEA), EHS reform, certification, GPP, spatial planning and rating schemes). The chosen instruments will be the focus of subtasks assigned to partners based on previous experience with the instrument in question. Task 4.1.4 will provide a broad basis for more in-depth considerations under T4.2-T4.4.

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

Sub task 4.2.1 Enhancement and development of innovative data capture tools (UEDIN, EFI(BOKU)) - Not all ES/NC information is readily captured. This task will focus on under-developed means of capturing information from stakeholders, including the public, on social values and the benefits of ES/NC, through crowd-sourcing methods. The approach will be based on current work in the EU FP7 project VOLANTE, aimed at providing tools and guidelines on how to set up a social valuation crowd sourcing campaign. The method will be tested in the OPERAS case-study exemplars (T2.2). Other selected ES/NC data capture tools with identified potential for

enhancement (T4.1) will also be included in this task, and links will be sought with the GEO BON project that is funded under the current call.

Sub task 4.2.2 Enhancement of selected indicator-based tools and development of new indicator-based tools (WCMC, Biotope, EFI(BOKU), ETH, Tiamasg) - 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 will be identified. Development and testing of appropriate indicators and indices (with protocols) for characterizing and quantifying ES/NC on the basis of measured biophysical attributes of ecosystems (the "supply" side) and/or on the basis of socio-economic data on "benefits" that incorporate ES/NC (the "demand" side), will be undertaken. This will include the development of spatially explicit indicators to quantify and map ES, drawing on the methods developed in T3.1. Such indicators will be developed and tested in the context of European and global policy and strategy instruments, in private sector reporting and assessment frameworks (links to T4.3 and 13) and trialed in T2.2.

Sub task 4.2.3 Enhancement of information tools to support accounting and ratings systems (Denkstatt, WCMC, LUND, ECM) Businesses increasingly require an understanding of their impact on ES/NC, and many aspire to be recognized against common social and environmental standards. Accounting systems such as life-cycle assessment (LCA), together with standards and certification schemes (e.g. for eco-labeling and/or environmental product declaration (EPD) criteria) both need to reflect ES/NC considerations. 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 trialed in the wine industry exemplar (T2.2).

Sub task 4.2.4 Improve data and information storage and presentation including web-based visualization interfaces (Tiamasg, WCMC, ECM, Biotope, EFI(BOKU)) - This task will draw together and make accessible data and information for use in decision-making tools to be enhanced and developed in T4.3. Information tools in T4.2 will be examined with regard to their usability as DS tools and modes of information transfer will be proposed to avoid common problems such as data and model availability biases for ES/NC assessments. This will include a description of data transfer and translation interfaces, development of databases and metadata standards, together with web-based visualization interfaces for data access and review, which will be made available via the Resource Hub (T5.1). Examples of database development will include a database structure for characterizing NC restoration and enhancement in the context of investment in green infrastructure and the no-net-loss initiatives put forward by the European Commission.

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

Sub task 4.3.1 Multicriteria decision analysis (EFI(BOKU), Biotope, ETH, ALU, OBU) - This task will integrate 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 will be 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 human health, safety, social, economic or health indicators will be considered. Other decision-support tools and methods including various types of Environmental Assessments will also employ approaches of relevance to MCDA.

Sub task 4.3.2 Cost-Benefit Analyses (IODINE, EFI(BOKU)) - 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. Novel approaches to couple the prior antagonist methods of CBA and MCDA will be tested to combine their potential strengths and overcome disciplinary barriers in ES/NC assessments.

Sub task 4.3.3 Environmental assessments (Biotope, ETH, EFI, DENKSTATT) - This task will focus on enhancing ES/NC representation in impact assessment tools (including sustainability assessments, SEA, and EIA). ES/NC will have to be integrated in a systematic way for the evaluation of potential impacts on the environment of projects, plans or programs – including policy instruments. Special focus will be put on investigating the potential of probabilistic approaches in operationalising the ES/NC in risk assessments. 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.
Sub task 4.3.4 Scenario and foresight tools (UEDIN, ETH) - This task aims to integrate the ES/NC concept into techniques 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.

Sub task 4.3.5 Improving existing and developing innovative user interfaces (ETH, Biotope, TIAMASG, PU) -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. The tools and methods will range from various computer software frameworks and applications to collaborative platforms including improved 3D visualizations. The social design and the governance conditions necessary for the successful operationalisation of the tools will be 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.

Task 4.4 Implementation and uptake of ES/NC concepts (Task lead ULUND)

Sub task 4.4.1 Design and 'success' criteria in implementing ES/NC concepts (ULUND) - Implementation performance success criteria will be identified and clustered to enable relationships between policy criteria and implementation logics to be explored and to highlight trade-offs between policy criteria. The task surveys theoretical arguments and analyses, reviews practical implementation experiences for risks, and surveys stakeholder concerns (link to T4.1) to identify guiding criteria for implementation design and performance and related principles (e.g. Polluter Pays, Beneficiary Pays, Cost Recovery). Criteria are structured and analysed to identify trade-offs and tensions between and among sets of criteria. Issues concerning implementation risk, safeguards, and verification, monitoring and enforcement requirements (VME) will be identified. Methods and instruments for implementation characterisation will be developed (e.g. identification of implementation drivers and their location in the system, responsibilities and how these are distributed and incentives facing actors). The task will report on implementation success criteria and identify information needs for implementation. Findings feed into all subsequent T4.4 tasks and into T4.5 and T5.1.

Sub task 4.4.2 Design of analytical methods and protocols to assess implementation (IODINE, ULUND) - This task develops analytical methods and protocols for evaluating costs and cost-structures of implementation and approaches to concept mainstreaming based on proposed instrument packages and combinations. Costs and benefits for implementations involving instrument packages cannot be calculated by simply summing those of individual instruments, so methods able to take account of cumulative impacts are needed based, for example, on the estimation of marginal abatement and marginal benefit curves. Development work will build on emerging methods, including the ARIES and InVEST toolkits that bring a spatial angle to assessment, along with stakeholder-derived scenarios. Scenarios, value-transfer methods and modified CBA will be used to analyse transaction costs, resource costs and environmental costs and benefits. The work will draw on TEEB / BESAFE results. Task 4.4.2 builds on task 4.4.1 and feeds into 4.4.3-4.4.5.

Sub task 4.4.3 Implementations of market-based approaches: (IEEP; IVM, IODINE; EFI(BOKU); WWF-Bulgaria; ULUND; BIOTOPE; CIFOR) - Using and further developing the criteria, conceptual models and analytical methods (from tasks 4.4.1 / 4.4.2), we will analyse alternative implementations of market-based methods for different implementation logics, identify obstacles, challenges and implementation risks, and propose ways of addressing these. We will appraise implementations of PES, Offset, Habitat Banking, Agricultural Compensation, and similar schemes linked to policy goals such as climate change mitigation and adaptation and habitat and biodiversity protection. The task focuses on costs and cost-structures, efficiency, effectiveness, cost-effectiveness, fairness and flexibility (and other relevant criteria identified in 4.4.1) for implementations developed in different contexts and under different logics (e.g. voluntary versus regulation-induced schemes; implementations that build on existing arrangements - such as high-level stewardship - versus new schemes; schemes where control is exercised through costs versus through prices). Task 4.4.3 uses outputs from 4.4.1/4.4.2 and links to T2.2 exemplars (Global REDD+ and climate change adaptation, Scotland and the Danube). The results feed via T4.5 into T5.1.

Sub task 4.4.4 Implementation of approaches based on spatial planning, permitting, and direct investment, including Green Infrastructure (GI) Interventions (ULUND, IVM, IEEP, UCD) - Using and further developing the criteria, models and analytical methods developed in T4.4.1/2, we will analyse alternative implementations of approaches based on spatial planning, permitting and direct investment, including Green Infrastructure (GI)

interventions developed for different implementation logics. We appraise interventions at different scale levels in development planning, spatial planning, permitting, and public/private sector investment planning linked to policy goals such as ecological restoration, climate adaptation, sustainable production and consumption, and improving individual/societal health and wellbeing. Novel technical instruments and tools will be appraised; e.g. tools for: identifying GI interventions, costs, benefits, and potential beneficiaries; appraising GI-investments; and, market-creating instruments that link GI investors to investment opportunities and GI-beneficiaries to GI-benefits. Obstacles to scheme implementation (e.g. financial accountability and auditing standards) will be identified and ways to address these proposed (e.g. using novel approaches to integrate economic and social values of GI into return-on-investment estimates based on cost-sharing, avoided costs, forward-looking GI exploitation plans and use of scenarios to factor-in environmental and urban dynamics). The task links to T3.2, draws on T4.4.1/2, liaises with the Urban case studies of T2.2, and delivers results to T4.5.

Sub task 4.4.5 Implementations in Green Business and Finance (DENKSTATT; WCMC; IODINE,

WWF-Bulgaria; ULUND; EFI(BOKU)) - Using and further developing the criteria, models and analytical methods developed in T4.4.1/2, this task analyses alternative implementations of the concepts in Green Business and Finance (both public and private sector) under different implementation logics. It appraises schemes for mainstreaming ES/NC concepts and tools through applications of place-based and chain-based instruments in Green Business and Green Finance initiatives, including those developed in T4.2; e.g. innovative new/improved business tools, products and services for Business Strategy Development, Business Risk Assessment, Business Reporting, Business Management Systems (such as EMAS - the Eco-Management and Audit Scheme), Business and Certification, and Product Labelling. Obstacles to (and risks in) implementation will be identified and ways to address these proposed (e.g. obstacles in taking up recommendations for integration in the Global Reporting Initiative). The task draws on T4.4.1/2 for methods, interacts with T4.2 for chain-based instruments, and liaises with T2.2 exemplars (Wine, Danube and Barcelona).

Task 4.5 Guidance on Choice and Application of Instruments (Taks lead: EFI)

Sub task 4.5.1 Coordinating Instruments Development (EFI, ULUND) - Both WP-internal and cross-WP cooperation are crucial to achieve the objectives of WP Instruments 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 will facilitate the interaction between 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 will 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).

Sub task 4.5.2 Synthesizing operational potentials (EFI, IEEP, ULUND, WCMC) - 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.

Sub task 4.5.3 Recommendations and good practice guidelines (EFI, ULUND, IEEP, ETH, WCMC, PU, ALU, OBU) - This task develops recommendations for the choice of instruments and compiles detailed good practice guidelines and training materials for the application of alternative tools and instruments developed in T4.2-4.4. Outcomes from the uptake analysis of T4.4 are synthesized and integrated by performing a meta-analysis that accounts for feedbacks from experiments in the Exemplars (T2.2), the meta-analysis (T2.1) and the synthesis of the Exemplars (T2.3) to propose generic and context-specific guidance for the design of effective implementation and uptake schemes for market creation and support based on existing, improved and new instrument combinations. The task will be implemented in cooperation with T5.1, where the Resource Hub functionality and structure is designed and with T2.3 where a lessons-learned database is compiled based on the results of the Exemplars. Results of T2.1 and T4.1 will be used to identify information needs for different stakeholder types, and help identify tailoring needs with respect to a diversity of use and implementation

demands to secure maximum applicability of the created guidance documents. Recommendations, guidelines and training materials will then be compiled from T4.2-T4.4 to feed into the Resource Hub.

	Person-Months per Participar	
Participant number ¹⁰	Participant short name ¹¹	Person-months per participant
1	UEDIN	21.00
2	VU-IVM	6.00
5	ULUND	20.00
6	EFI	53.00
8	WCMC	23.00
9	TIAMASG	16.00
10	IEEP	24.00
11	UCD	3.00
13	UP	6.00
14	ETH	38.00
15	WWF Bulgaria	14.00
19	ECM	6.00
20	BIOTOPE	29.00
21	IODINE	10.00
22	Denkstatt	24.00
23	CIFOR	3.00
26	ALU	6.00
27	UBO	4.00
	Total	306.00

List of deliverables

Delive- rable Number 61	Deliverable Title	Lead benefi- ciary number	Estimated indicative person- months	Nature 62	Dissemi- nation level ⁶³	Delivery date ⁶⁴
D4.1	Report and Policy brief on existing and emerging policy needs and opportunities	10	15.00	R	PU	16
D4.2	A report on lessons learned and recommendations for taking account ES/NC in key policy instruments	10	30.00	R	PU	36
D4.3	Synthesis report documenting the operational potential of ES/NC instruments	6	30.00	R	PU	52

List of deliverables

Delive- rable Number 61	Deliverable Title	Lead benefi- ciary number	Estimated indicative person- months	Nature 62	Dissemi- nation level ⁶³	Delivery date ⁶⁴
D4.4	New and enhanced existing data capture, indicator-based, and information tools incl. documentation	8	70.00	Р	PU	48
D4.5	Good practice guidelines for instrument choice and tutorials for instrument application	6	20.00	R	PU	48
D4.6	New and improved decision support tools and methods, linked with a user interface	14	72.00	Р	PU	48
D4.7	Management information tools and manuals for concept mainstreaming in three arenas	5	65.00	0	PU	52
		Total	302.00			

Description of deliverables

D4.1) Report and Policy brief on existing and emerging policy needs and opportunities: Report and Policy brief on existing and emerging policy needs and opportunities at EU and MS level (Task 4.1) [month 16]

D4.2) A report on lessons learned and recommendations for taking account ES/NC in key policy instruments: A report on lessons learned and recommendations for taking account of ES/NC in key policy instruments and their implementation (Task 4.1). Should include outcomes from Assessment of existing and emerging practical needs for integration and uptake of ES/NC for different stakeholders, responding to policy needs and realizing opportunities, including a review of instruments as a basis for WP11-13 (Milestone 4.12) [month 36]

D4.3) Synthesis report documenting the operational potential of ES/NC instruments: Synthesis report documenting the operational potential of ES/NC instruments, including road maps for actions in different policy fields (Task 4.5) [month 52]

D4.4) New and enhanced existing data capture, indicator-based, and information tools incl. documentation: New and enhanced existing data capture, indicator-based, and information tools supporting accounting and ratings systems delivered and made available via the Resource Hub with a report documenting the improved tools and how they incorporate ES/NC information and data (Task 4.2). [month 48]

D4.5) Good practice guidelines for instrument choice and tutorials for instrument application: Good practice guidelines for instrument choice and tutorials for instrument application (Task 4.5) [month 48]

D4.6) New and improved decision support tools and methods, linked with a user interface: New and improved decision support tools and methods, linked with a user interface, delivered to the resource hub with a report summarizing the methods and how these embed the ES/NC concept into decision-making processes (Task 4.3) [month 48]

D4.7) Management information tools and manuals for concept mainstreaming in three arenas: Management information tools and manuals for concept mainstreaming with a report appraising implementations of new/improved instruments in three arenas (market-based schemes, spatial planning-based schemes, and Green Business and Finance Initiatives) (Task 4.4) [month 52]

Schedule of relevant Milestones

Milestone number ⁵⁹	Milestone name	Lead benefi- ciary number	Delivery date from Annex I ⁶⁰	Comments
MS52	MS4.1 Module Instruments Interaction Plan ready/revisited (Task 4.5)	6	3	
MS53	MS4.2 Inventory and longlist of instruments (Task 4.5)	6	9	
MS54	MS4.3 Means for enhancing selected ES/NC data tools and accounting and ratings systems identified	8	15	Means for enhancing selected ES/NC data capture, storage and presentation tools and indicator-based, accounting and ratings systems identified and their feasibility assessed (Task 4.2)
MS55	MS4.4 Procedures for the integration of the ES/NC into existing decision-support tools	14	15	Procedures for the integration of the ES/NC into existing decision-support tools identified with an assessment of method feasibility (Task 4.3)
MS57	MS4.6 Policy gaps and needs assessment survey / workshops (MS and EU level) (Task 4.1): Interv	5	15	Policy gaps and needs assessment survey /online workshops (MS and EU level) (IEEP Task 4.1): surveys/ workshops with stakeholders (ULUND Task 4.4)
MS58	MS4.7 Data capture, indicator-based, and information tools selected for enhancement, development an	8	18	Data capture, indicator-based, and information tools selected for enhancement, development and trial
MS59	MS4.8 DELETED	10	30	
MS60	MS4.9 Analysis of framework conditions securing successful implementation of DS tools and methods	14	18	
MS61	MS4.10 Selection of decision-support tools and methods for the exemplars	14	18	
MS62	MS4.11Documentation of work design of implementation tool approach against criteria, focus on Certif	5	25	Documentation of work design of implementation tool approach against criteria, focus on Certification adn link to Carbon,

Schedule of relevant Milestones

Milestone number ⁵⁹	Milestone name	Lead benefi- ciary number	Delivery date from Annex I ⁶⁰	Comments
				Cultural Evaluation and Governance and Spatial planning aspects, NLL and offse
MS63	MS4.12 Partner Feedback (Task 4.1.2 bottom-up analysis) on existing and emerging practical needs fo	10	24	Partner Feedback (Task 4.1.2 bottom-up analysis) on existing and emerging practical needs for integration and uptake of ES/NC concepts for MS48 workshop
MS64	MS4.13 Selection of specific instruments, sectors and stakeholders for in-depth assessment	10	24	Selection of specific instruments, sectors and stakeholders for in-depth assessment
MS65	MS4.14 Emerging needs workshop (EU level)	10	32	
MS66	MS4.15 Updated report on testing of information tools for ES/NC data capture, storage, presentation	8	38	
MS67	MS4.16 Trialling new and enhanced data capture, indicator -based, and information tools within exemp	8	36	
MS68	MS4.17 Interim analyses of implementation designs in the three arenas	5	42	

Project Number ¹	308393		Project Acronym ²	0	PERAs	
One form per Work Package						
Work package number	r ⁵³	WP5	Ту	/pe of activity ⁵⁴		RTD
Work package title Resource Hu)			
Start month		1				
End month		60				
Lead beneficiary numb	ber 55	8				

Objectives

• Understand user needs across a range of constituencies;

Design and develop the common platform accordingly to meet these needs;

• Define a process and strategy for longer-term resourcing and maintenance of the platform;

• Build constituencies of support for ES/NC implementation 'logics', and to contribute to capacity development amongst practitioners, academics and other user communities.

• 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 enable deep involvement of stakeholders in selected exemplars through professional facilitation;

• To enable quality delivery and corrective action for stakeholder engagement by monitoring the involvement of stakeholders throughout the project.

Description of work and role of partners

Task 5.1 Resource Hub development (task lead: WCMC)

Sub task 5.1.1 Identification of communities of practice and user needs assessment (ULUND, WCMC, UEDIN, Prospex, UFZ, ALU, OBU) - This task will drive the design and content of the common platform being developed in collaboration with the OpenNESS project. It will focus on understanding the opportunities and challenges that practitioners face, drawing on direct stakeholder engagement (WP6 and T5.2) and lessons from exemplars (T2.3). The RH has the potential to serve diverse communities and actors, including landowners, businesses, public sector managers. etc. Task 15.1 will explore different markets for needs amongst these communities as well as identifying service providers relevant to this cross-section of needs.

Sub task 5.1.2 Design the structure and content of the common platform (CP) in collaboration with the OpenNESS project (WCMC, Tiamasg, ULUND, UEDIN) - It is likely that different constituencies (researchers, policy-makers, businesses, land managers, etc.) will benefit from the CP and require access. Thus the CP will be designed with different 'doors' or entry points for different users – possibly in the form of questions that lead to signposts to the various parts of the CP. The design of the site will need to take into account its longer term use and build in flexibility for expansion as may be required. The content itself is likely to organize information in five areas: tools, projects, resources, organizations and practitioners – and will include material such as examples of the different uses of tools; understanding how tools work; guidelines and training materials for users; promotional materials; platform/s for information exchange including data from exemplars and visualisation tools built on such data; possibly a social networking/peer-to-peer exchange mechanisms, and; in future, possible accreditation elements. CP design will be determined in close collaboration with WP6 to reflect the community outreach activities proposed there.

Sub task 5.1.3 - Construct the CP in collaboration with the OpenNESS project (Tiamasg, WCMC, ECM, Denkstatt, CIFOR) - The platform will provide technical assistance and guidance, tools and data, and both practitioner and young researcher training. There will be different elements that require construction. These will include the website structure; data interface; guided search capacity; social networking/user-to-user interaction and user experience feedback elements; knowledge-sharing, results reporting and user uploading elements. The role of the hub as a go-to mechanism for matchmaking users to service-providers will be reflected in its structure. Within this task there will also be writing and preparation of products and materials that will be made available

on the site alongside the tools developed in Module Instruments (T4.2-T4.4), as well as the site text. A range of partners will undertake specific roles in this task.

Sub task 5.1.4 Maintenance and perennity of the CP (WCMC, LUND, UEDIN, Prospex, VU-IVM, UFZ, ALU, OBU, EFI) - Maintenance needs to ensure the smooth operation of the CP will include testing prior to launch, updating, consultation and user evaluation. The intention for the CP is that it becomes a resource that will exist beyond the life of the OPERAS project, and as such a business plan to ensure perennity will be developed. This will reflect governance issues including quality assurance mechanisms, alongside financial sustainability planning. The latter may focus on the potential for subscription-based financing models targeting different user communities.

Task 5.2 Stakeholder engagement and facilitation (task lead: Prospex)

Sub task 5.2.1 Stakeholder analysis and engagement plan (Prospex, IEEP, UEDIN) - Stakeholder identification and analysis will be carried out based on inputs from all partners, existing networks, previous and on-going projects and advice from external resource experts. This analysis provides tools for carefully selecting stakeholder involvement activities and the inclusion of diverse groups and individuals from government, civil society, business, research and policy-makers that are broadly representative of the relevant societal settings. A stakeholder engagement plan will define the specifics of this involvement for each of the stakeholder groups.

Sub task 5.2.2 Setting up and managing the OPERAS User Board (Prospex, UEDIN) - Ongoing, close collaboration with existing and future users and clients of ES/NC valuation is key to the ultimate success of OPERAS. OPERAS will create a User Board as a continuous instrument for inputs and exchanges with key stakeholders that will practice ES/NC evaluation and those that potentially request and buy these services. The members of the board, selected through the stakeholder analysis (Task T6.1.1) will comprise actively interested parties. They will be engaged on an ongoing basis through a dedicated protected website and direct communication and exchange on specific questions of relevance in the project. The board will physically meet for four professionally facilitated workshops across the course of OPERAS. Inputs received from the board will be registered, monitored and reported to ensure follow up in all the WPs.

Sub task 5.2.3 Facilitation of stakeholder engagement in selected exemplars (Prospex) - In four of the exemplars, OPERAS will make use of professional facilitation services for workshops with stakeholders. T5.2 will liaise with WPs on the content preparation and specific objective and planning for each of the workshops. T5.2 will also work with WPs to establish the list of participants. T5.2 will provide professional process design and facilitation. It will also support the logistics for these events. T5.2 will provide reports on all these workshops that record, trace and use the inputs received. Furthermore, it will work with WPs on the comprehensive reporting of the workshops, including analysis and conclusions. The use of this input by stakeholders will be monitored by T5.2 (Task T5.2.4).

Sub task 5.2.4 Monitoring of and corrective action for stakeholder engagement (Prospex) - T5.2 will establish a monitoring system for stakeholder engagement in OPERAS. It will trace the use of inputs received from stakeholders. It will record and analyse the assessment of stakeholders of the involvement activities throughout the project, including the User Board (Task 5.2.2), the facilitated workshops (Task 5.2.3) and other stakeholder involvement activities undertaken by project partners as laid out in the stakeholder analysis and engagement plan (Task 5.2.1). On this basis, corrective action will be taken wherever stakeholder input has not been adequately addressed in the project and wherever participating stakeholders flag a relevant issue in view of the quality of the involvement processes. T5.2 will alert other WPs about identified aspects, check on the follow-up of these alerts and regularly report on the monitoring to the other WPs in OPERAS.

Person-Months per Participant

Participant number ¹⁰	Participant short name ¹¹	Person-months per participant
1	UEDIN	15.00
4	UFZ	2.00
5	ULUND	5.00
6	EFI	5.00

Person-Months per Participant

Participant number ¹⁰	Participant short name ¹¹	Person-months per participant
7	Prospex	20.00
8	WCMC	12.00
9	TIAMASG	25.00
10	IEEP	3.00
19	ECM	7.00
22	Denkstatt	3.00
23	CIFOR	2.00
26	ALU	3.00
27	UBO	2.00
	Total	104.00

List of deliverables

Delive- rable Number	Deliverable Title	Lead benefi- ciary number	Estimated indicative person- months	Nature 62	Dissemi- nation level ⁶³	Delivery date ⁶⁴
D5.1	An initial Scoping Document for the Common Platform	8	3.00	R	RE	19
D5.2	Demonstration version of Common Platform	9	20.00	D	RE	29
D5.3	Second version of the Scoping Document	8	3.00	R	PP	39
D5.4	A prototype of the Common Platform	9	20.00	Р	PU	46
D5.5	Third version of the Scoping Report	8	10.00	R	PP	51
D5.6	Business plan to ensure perennity	8	27.00	R	PU	54
D5.7	Comprehensive report on exemplar stakeholder workshops and stakeholder engagement monitoring	7	18.00	R	PU	58
		Total	101.00			

Description of deliverables

D5.1) An initial Scoping Document for the Common Platform: An initial Scoping Document for the Common Platform. The Scoping Document will include: i) the shared vision between OPERAs and OPENness ii) the potential users and their roles and needs iii) proposed content of the Common Platform iv) branding of the Common Platform [month 19]

D5.2) Demonstration version of Common Platform: A demonstration version of the Common Platform available and an agreed plan on how to gather feedback from both the OPERAs and OPENness stakeholders and other interested individuals within the EC. [month 29]

D5.3) Second version of the Scoping Document: Second version of the Scoping Document. The Scoping Document will be expanded to include: i) the market analysis ii) the outline of the Business Plan iii) Input from

stakeholders on recommendations on further refining the content and functionality of the Common Platform [month 39]

D5.4) A prototype of the Common Platform: A prototype Common Platform including menu of multi-scale solutions available for comment and an agreed plan on how to gather feedback from, both the OPERA and OPENness stakeholders and other interested individuals within the EC. [month 46]

D5.5) Third version of the Scoping Report: Third version of the Scoping Report. The Scoping Document expanded to include: i) reflect the work of the prototype ii) draft elements of the Business Plan iii) areas where agreement will need to be reached between OPERAs, OPENness and EC [month 51]

D5.6) Business plan to ensure perennity: Final Business Plan for the long term maintenance and further development of the Common Platform and a fully operational Common Platform [month 54]

D5.7) Comprehensive report on exemplar stakeholder workshops and stakeholder engagement monitoring: Comprehensive report on exemplar stakeholder workshops and stakeholder engagement monitoring and corrective action (Task 5.2) [month 58]

Milestone number ⁵⁹	Milestone name	Lead benefi- ciary number	Delivery date from Annex I ⁶⁰	Comments
MS69	MS5.1 Drafts wire frames based on information gathered through the different stakeholder consultatio	8	22	
MS70	MS5.2 OPERAs User Board	7	24	
MS71	MS5.3 Wire frames developed further to take into account feedback from users	8	27	
MS72	MS5.4 OPERAs Userboard meeting	7	36	
MS73	MS5.5 OPERAs Userboard meeting	7	48	

Schedule of relevant Milestones

Project Number ¹	308393			Project Acronym ²	O	PERAs
One form per Work Package						
Work package number	r ⁵³	WP6	Ту	/pe of activity ⁵⁴		OTHER
Work package title Outreach and			di	ssemination		
Start month		1				
End month		60				
Lead beneficiary numb	ber 55	1				

Objectives

• To exploit and disseminate the project results;

• To build a Community of Excellence around the OPERAS Resource Hub (T5.1);

• To provide peer-to-peer learning, training, and outreach activities.

Description of work and role of partners

Task 6.1 Constituency building, outreach and project dissemination (Task lead: UEDIN)

Sub task 6.1.1 Project dissemination UEDIN, WCMC, WWF Bulgaria, WWF Romania) - OPERAS will maximize impacts in science, policy and practice. An overall dissemination plan will set out targeted strategies for the various stakeholder groups, and will be regularly adjusted throughout the project. Professional branding of the project, including the website, project flyers, newsletters, policy briefs and reports will ensure a recognizable identity. Novel communication methods such as social media, webinars, the development of short films, and journalist field trips will further facilitate exchange of the OPERAS findings.

Sub task 6.1.2 Outreach and constituency building (Oppla, ULUND, Prospex, WWF Bulgaria, WWF Romania) - Outreach and constituency building will be essential to guarantee successful adoption of the resource hub by OPERAS stakeholders. Following the user needs assessment (D15.1) an outreach plan will be developed, targeted to the user groups. Tailored promotional material will be developed, and promotional events will be organized for business executives and senior policy makers. In addition, user guidelines and training material will be developed for the OPERAS tools and instruments, which will incorporated in the Resource Hub and used in 4 two-day training workshops for professionals.

Sub task 6.1.3 OPERAS summer school (CNRS, UEDIN, ETH) - A 10-day postgraduate summer school will be organized for PhD students and young researchers, focusing on ES/NC operationalisation. The course will present the latest scientific knowledge and provide an overview of the novel OPERAS tools and instruments, including examples of their use in the T2.2 Exemplars.

Sub task 6.1.4 OPERAS conference (UEDIN, WCMC) - A peer-to-peer exchange conference will be organized where the OPERAS Exemplars will be presented along with key project results, including the Resource Hub. The conference will form the major closing activity for the project, and will bring together a large part of the OPERAS CoE.

Person-Months per Participant

Participant number ¹⁰	Participant short name ¹¹	Person-months per participant
1	UEDIN	9.00
5	ULUND	4.00
8	WCMC	2.35
9	TIAMASG	12.00

Person-Months per Participant

Participant number ¹⁰	Participant short name ¹¹	Person-months per participant
12	CNRS	9.00
14	ETH	5.00
15	WWF Bulgaria	10.00
16	WWF Romania	3.00
29	OPPLA	12.66
	Total	67.01

List of deliverables

Delive- rable Number	Deliverable Title	Lead benefi- ciary number	Estimated indicative person- months	Nature 62	Dissemi- nation level ⁶³	Delivery date ⁶⁴
D6.1	Dissemination strategy and plan	1	2.00	R	PP	12
D6.2	Short films describing issues	1	3.00	0	PU	18
D6.3	Policy brief Resource Hub	8	1.00	R	PU	32
D6.4	Short films describing resource hub and instruments	8	5.00	0	PU	50
D6.5	Summer School for post graduate researchers	12	9.00	0	PU	54
D6.6	Peer-to-Peer exchange conference	8	6.00	0	PU	58
		Total	26.00			

Description of deliverables

D6.1) Dissemination strategy and plan: The deliverable will provide a detailed dissemination strategy and plan, which will be reviewed at the end of each reporting period. It will be developed in close collaboration between UEDIN and WCMC, with input from the other partners. [month 12]

D6.2) Short films describing issues: Production of short films describing the underlying issues in operationalising ES/NC, to be placed on the project website, and at a later stage in the Resource Hub. The filming will be subcontracted by UEDIN. [month 18]

D6.3) Policy brief Resource Hub: Policy brief, following launch of Resource Hub to communicate OPERAs activities and help build the Community of Excellence. [month 32]

D6.4) Short films describing resource hub and instruments: Production of short films describing the Resource Hub and the Instruments that are available within it. The films will be incorporated in the Resource Hub and available from the OPERAs website. The filming will be subcontracted by UEDIN. [month 50]

D6.5) Summer School for post graduate researchers: A Summer School will be organised for post graduate research focusing on the ES/NC operationalisation. CNRS will lead the organisation and be in charge of logistics, but all OPERAs partners are expected to contribute to lecturing and providing training material. [month 54]

D6.6) Peer-to-Peer exchange conference: A Peer-to-Peer exchange conference for ES/nC practitioners and policy makers will be organised to demonstrate the Resource Hub and tool developed within OPERAs and strengthen the Community of Excellence. WCMC will lead the organisation and be in charge of logistics, but all OPERAs partners are expected to contribute to presentations and providing training material. [month 58]

Schedule of relevant Milestones

Milestone number ⁵⁹	Milestone name	Lead benefi- ciary number	Delivery date from Annex I ⁶⁰	Comments
MS74	MS6.1 Website launched using OPERAS branding (Task 6.1)	1	3	
MS75	MS6.2 First project flyer (Task 6.1)	1	6	
MS76	MS6.3 Outreach plan (Task 6.1)	1	14	
MS77	MS6.4 Launch of first short film clip (Task 6.1)	1	30	
MS78	MS6.5 Second flyer, following first policy brief (task 6.1)	1	32	
MS79	MS6.6 Updated outreach plan, with planning for summer school and final conference (task6.1)	1	40	

Project Number ¹		308393	308393 Proj		ect Acronym ²	OPERAs	
List and Schedule of Milestones							
Milestone number ⁵⁹	Milestone	name	WP numbe	er ⁵³	Lead benefi- ciary number	Delivery date from Annex I 60	Comments
MS1	MS1.1 Note on agreed communication MS1 procedures and quality control, mailing lists (Task 1.3)		WP1		1	3	
MS2	MS1.2 1st Consortium IS2 Assembly to evaluate progress (Task 1.3)		WP1		1	2	
MS3	MS1.3 2nd Consortiur Assembly evaluate p (Task 1.3)	l n to rogress	WP1		1	10	
MS1.4 3rd Consortium MS4 Assembly to evaluate progress (Task 1.3)		WP1		1	17		
MS5	MS1.5 4th Consortium MS5 Assembly to evaluate progress (Task 1.3)		WP1		1	26	
MS6	AS6 (Task 1.3) (Task 1.3)		WP1		1	34	
MS7	MS1.7 6th Consortiur Assembly evaluate p (Task 1.3)	n to rogress	WP1		1	42	
MS8	MS1.8 7th Consortiur Assembly evaluate p (Task 1.3)	n to rogress	WP1		1	50	
MS9	MS2.1 Revealed assessment	view of S/NC nt	WP2		26	6	2.2, 2.3

Milestone number ⁵⁹	Milestone name	WP number 53	Lead beneficiary number below the provided below the from Annex I for the provided below		Comments
	protocols with input from T 2.3 (DS)				
MS10	MS2.2 Draft Blue Print Protocol for systematic reporting of Exemplars and Meta Analysis	WP2	1	6	2.1, 2.2
MS11	MS2.3 Preliminary report on knowledge gaps & demand for instruments reported to WP3 & WP4 (Task 2.1)	WP2	26	8	a) Preliminary report on knowledge gaps and demand for instruments reported to WPs 3+4, gaps b) work of existing exemplars, and c) results on gaps 2.2, 2.3
MS12	MS2.4 Discuss draft BluePrint (Task 2.2)	WP2	1	12	2.1, 2.2
MS13	MS2.5 First Reporting Blue Print Protocol (1.0) revisit each 18 month reporting period)	WP2	1	12	2.1, 2.2
MS14	MS2.6Draft description of exemplars study design, stakeholder needs and tested tools/instruments	WP2	5	12	2.1, 2.3
MS15	MS2.7 Ranking of effectiveness of ES/NC based measures as valued in scientific literature (Task 2.1)	WP2	26	16	2.2, 2.3
MS16	MS2.8 Database designed to compile lessons-learned across the WP (Task 2.3)	WP2	1	30	2.1, 2.2
MS17	MS2.9 Report on Second Blue Print (2.0) revisit each 18 month reporting period	WP2	1	30	2.1, 2.2
MS18	MS2.10Interim decision trees for selecting instruments for maintaining and protecting ES	WP2	1	29	2.1, 2.2

Milestone number ⁵⁹	Milestone name	WP number 53	Lead benefi- ciary number	Delivery date from Annex I ⁶⁰	Comments
MS19	MS2.11 Exemplars interim report	WP2	5	31	2.1, 2.3
MS20	MS2.12Workshops to elaborate iteratively lessons learned from Meta Analysis and Exemplars	WP2	1	32	2.1, 2.2
MS21	MS2.13 Report on Third Blue Print (3.0)	WP2	1	33	2.1, 2.2
MS22	MS2.14 Evaluation of processes in each exemplar with potential adaptation to the work plan	WP2	5	38	2.1, 2.3
MS23	MS2.15 Final decision trees for selecting instruments for maintaining & protecting ES/NC	WP2	1	38	2.1, 2.2
MS24	MS2.16 Decision tree workshops in collaboration with MA and EX	WP2	1	28	2.1, 2.2
MS25	MS2.17 Report on Fourth Blue Print	WP2	1	47	2.1, 2.2
MS26	MS2.18 Contributions to the Resource Hub	WP2	1	50	2.1, 2.2
MS27	MS2.19 Final Operas Exemplar Conference	WP2	5	50	2.1, 2.3
MS28	MS3.1 Set strategy for first applications and identify development needs, WP meeting (Task 3.1.2)	WP3	3	3	
MS29	MS3.2 Delivery of draft conceptual framework of valuation approach (task 3.3.1)	WP3	25	6	
MS30	MS3.3Discussion paper on the design of a conceptual framework on	WP3	2	19	Discussion paper on the design of a conceptual framework on incorporating spatial

Milestone number 59	Milestone name	WP number ⁵³	Lead benefi- ciary number	Delivery date from Annex I ⁶⁰	Comments
	incorporating spatial (task 3.3)				complexity in value transfer functions
MS31	MS3.4 Discussion paper on establishing definitions. For social & cultural values & h(task 3.2)	WP3	11	16	Discussion paper on establishing definitions. For social and cultural values and how they relate to changes in the environment
MS32	MS3.5 Discussion pap conceptual frwork for WP3 & plan application in Scot.Ex(T3.5)	er:methodologica WP3	1/ 2	18	Discussion paper on a full methodological/conceptual framework for WP3 and a plan for application in the Scotland exemplar
MS33	MS3.6 Generic questions to selected exemplars re salient characteristics of ES/NC & stkholders(T3.4)	WP3	5	10	Set of generic questions sent to selected exemplars regarding salient characteristics of ES/NC and stakeholders
MS34	MS3.7 Identification of knowledge and policy gaps in the context of exemplars and instruments(T3.4)	WP3	10	18	Identification of knowledge and policy gaps in the context of exemplars and instruments
MS35	MS3.8 Summary table of exemplar needs from WP3(task 3.5)	WP3	13	18	
MS36	MS3.9 coordinated plan for the application of monetary valuation in selected exemplars (T3.3)	WP3	25	20	
MS37	MS3.10 coordinated plan for the application of social valuation in selected exemplars(T3.2)	WP3	11	32	
MS38	MS3.11teleconf/ wkshop with exemplars:economic valuation in existing ac	WP3 counting&reporti	2 ngformats(T3.3	30	minutes of a teleconf/workshop with exemplars to discuss recommendations for integration of spatially sensitive, transferable methodology for economic valuation of ES/NC in existing accounting formats

Milestone number 59	Milestone name	WP number 53	Lead benefi- ciary number	Delivery date from Annex I ⁶⁰	Comments
MS39	MS3.12Draft guidelines with best practice on the use of economic valuation methods p	WP3	10	33	Draft guidelines with best practice reccomendations on the use of economic valuation methods provided to resource hub
MS40	MS3.13 paper submitted: Framework for model-based quantification of ES and their uncertainty(T3.1)	WP3	12	36	
MS41	MS3.14 First test of the portfolio of ideal types in some exemplars (T3.4)	WP3	14	36	
MS42	MS3.15 Discussion paper:trade-off analysis performed for at least 3 different exemp(input for MS3.16	WP3	12	36	
MS43	MS3.16Synthesis workshop for documentation & user guidance for new methods & the decision trees(T3.5	WP3	3	37	
MS44	MS3.17 Expanded meta-analysis database made available to Resource Hub under restricted Access(T3.3)	WP3	2	48	
MS45	MS3.18 Provide knowledge on the governance typology with guidelines to the resource hub(T3.4)	WP3	5	50	
MS46	MS3.19 publication: use of governance typology to assess existing EU/other policies for harnesing ES	WP3	5	54	
MS47	MS3.20 Final report or scientific paper of task 3.1	WP3	3	60	

Milestone number ⁵⁹	Milestone name	WP number 53	Lead benefi- ciary number	Delivery date from Annex I ⁶⁰	Comments
MS48	MS3.21 Panel on the application of novel social valuation methods as applied in one or more exemplar	WP3	11	60	
MS49	MS3.22Paper submitted on the meta-analytic database(T3.3)	WP3	2	60	
MS50	MS3.23 Synthesis paper on Task 3.5 results	WP3	2	60	
MS51	MS3.25 Identification of policy integration needs, cross jurisdiction issues, PR arrangements	WP3	5	18	
MS52	MS4.1 Module Instruments Interaction Plan ready/revisited (Task 4.5)	WP4	6	3	
MS53	MS4.2 Inventory and longlist of instruments (Task 4.5)	WP4	6	9	
MS54	MS4.3 Means for enhancing selected ES/NC data tools and accounting and ratings systems identified	WP4	8	15	Means for enhancing selected ES/NC data capture, storage and presentation tools and indicator-based, accounting and ratings systems identified and their feasibility assessed (Task 4.2)
MS55	MS4.4 Procedures for the integration of the ES/NC into existing decision-support tools	WP4	14	15	Procedures for the integration of the ES/NC into existing decision-support tools identified with an assessment of method feasibility (Task 4.3)
MS57	MS4.6 Policy gaps and needs assessment survey / workshops (MS and EU level) (Task 4.1): Interv	WP4	5	15	Policy gaps and needs assessment survey /online workshops (MS and EU level) (IEEP Task 4.1): surveys/ workshops with stakeholders (ULUND Task 4.4)

Milestone number ⁵⁹	Milestone name	WP number 53	Lead benefi- ciary number	Delivery date from Annex I ⁶⁰	Comments
MS58	MS4.7 Data capture, indicator-based, and information tools selected for enhancement, development an	WP4	8	18	Data capture, indicator-based, and information tools selected for enhancement, development and trial
MS59	MS4.8 DELETED	WP4	10	30	
MS60	MS4.9 Analysis of framework conditions securing successful implementation of DS tools and methods	WP4	14	18	
MS61	MS4.10 Selection of decision-support tools and methods for the exemplars	WP4	14	18	
MS62	MS4.11Documentation of work design of implementation tool approach against criteria, focus on Certif	n WP4	5	25	Documentation of work design of implementation tool approach against criteria, focus on Certification adn link to Carbon, Cultural Evaluation and Governance and Spatial planning aspects, NLL and offse
MS63	MS4.12 Partner Feedback (Task 4.1.2 bottom-up analysis) on existing and emerging practical needs fo	WP4	10	24	Partner Feedback (Task 4.1.2 bottom-up analysis) on existing and emerging practical needs for integration and uptake of ES/NC concepts for MS48 workshop
MS64	MS4.13 Selection of specific instruments, sectors and stakeholders for in-depth assessment	WP4	10	24	Selection of specific instruments, sectors and stakeholders for in-depth assessment
MS65	MS4.14 Emerging needs workshop (EU level)	WP4	10	32	
MS66	MS4.15 Updated report on testing of information tools for ES/NC data capture, storage, presentation	WP4	8	38	
MS67	MS4.16 Trialling new and enhanced	WP4	8	36	

Milestone number 59	Milestone name	WP number 53	Lead benefi- ciary number	Delivery date from Annex I ⁶⁰	Comments
	data capture, indicator -based, and information tools within exemp				
MS68	MS4.17 Interim analyses of implementation designs in the three arenas	WP4	5	42	
MS69	MS5.1 Drafts wire frames based on information gathered through the different stakeholder consultatio	WP5	8	22	
MS70	MS5.2 OPERAs User Board	WP5	7	24	
MS71	MS5.3 Wire frames developed further to take into account feedback from users	WP5	8	27	
MS72	MS5.4 OPERAs Userboard meeting	WP5	7	36	
MS73	MS5.5 OPERAs Userboard meeting	WP5	7	48	
MS74	MS6.1 Website launched using OPERAS branding (Task 6.1)	WP6	1	3	
MS75	MS6.2 First project flyer (Task 6.1)	WP6	1	6	
MS76	MS6.3 Outreach plan (Task 6.1)	WP6	1	14	
MS77	MS6.4 Launch of first short film clip (Task 6.1)	WP6	1	30	
MS78	MS6.5 Second flyer, following first policy brief (task 6.1)	WP6	1	32	
MS79	MS6.6 Updated outreach plan, with planning for summer school and final conference (task6.1)	WP6	1	40	

WT5: Tentative schedule of Project Reviews

Project Number ¹ 308393		308393	Project Acronym ²		OPERAs	
Tentative schedule of Project Reviews						
Review number 65Tentative timingPlanned venue of review				Comments	s, if any	
RV 1	18	Brussels		Follows fire	st reporting period	
RV 2	36	Brussels		Follows second reporting period		
RV 3	54	Brussels		Follows thi	ird reporting period	

WT6: Project Effort by Beneficiary and Work Package

			γ	-	-		
Project Number ¹	308393		Project Acronym	1 ²	OPERAs		
	Indic	ative efforts (r	nan-months) p	er Beneficiary	per Work Pac	kage	
Beneficiary number and short-name	WP 1	WP 2	WP 3	WP 4	WP 5	WP 6	Total per Beneficiary
1 - UEDIN	44.00	41.00	0.00	21.00	15.00	9.00	130.00
2 - VU-IVM	4.00	15.00	62.00	6.00	0.00	0.00	87.00
3 - KIT	4.00	9.00	44.00	0.00	0.00	0.00	57.00
4 - UFZ	0.00	10.00	6.00	0.00	2.00	0.00	18.00
5 - ULUND	4.00	15.00	19.40	20.00	5.00	4.00	67.40
6 - EFI	4.00	0.00	0.00	53.00	5.00	0.00	62.00
7 - Prospex	0.00	0.00	0.00	0.00	20.00	0.00	20.00
8 - WCMC	4.00	0.00	0.00	23.00	12.00	2.35	41.35
9 - TIAMASG	0.00	0.00	0.00	16.00	25.00	12.00	53.00
10 - IEEP	0.00	0.00	21.00	24.00	3.00	0.00	48.00
11 - UCD	0.00	9.00	27.00	3.00	0.00	0.00	39.00
12 - CNRS	0.00	32.00	34.00	0.00	0.00	9.00	75.00
13 - UP	1.00	33.00	11.00	6.00	0.00	0.00	51.00
14 - ETH	0.00	5.00	3.60	38.00	0.00	5.00	51.60
15 - WWF Bulgaria	0.00	15.00	5.00	14.00	0.00	10.00	44.00
16 - WWF Romania	0.00	5.00	0.00	0.00	0.00	3.00	8.00
17 - SGM	0.00	12.00	0.00	0.00	0.00	0.00	12.00
18 - FFCUL	0.00	12.00	0.00	0.00	0.00	0.00	12.00
19 - ECM	0.00	0.00	0.00	6.00	7.00	0.00	13.00
20 - BIOTOPE	0.00	0.00	0.00	29.00	0.00	0.00	29.00
21 - IODINE	0.00	0.00	0.00	10.00	0.00	0.00	10.00
22 - Denkstatt	0.00	2.00	0.00	24.00	3.00	0.00	29.00

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WT6: Project Effort by Beneficiary and Work Package

Beneficiary number and short-name	WP 1	WP 2	WP 3	WP 4	WP 5	WP 6	Total per Beneficiary
23 - CIFOR	0.00	10.00	0.00	3.00	2.00	0.00	15.00
24 - CSIC	0.00	13.00	6.00	0.00	0.00	0.00	19.00
25 - UEA	0.00	0.00	7.50	0.00	0.00	0.00	7.50
26 - ALU	0.00	14.00	0.00	6.00	3.00	0.00	23.00
27 - UBO	0.00	13.00	4.00	4.00	2.00	0.00	23.00
28 - UNEXE	0.00	0.00	4.50	0.00	0.00	0.00	4.50
29 - OPPLA	0.00	0.00	0.00	0.00	0.00	12.66	12.66
Total	65.00	265.00	255.00	306.00	104.00	67.01	1,062.01

WT7: Project Effort by Activity type per Beneficiary

Project Number ¹		308393			Projec	ct Acronym	2	OP	ERAs					
				Indi	cative effor	rts per Acti	vity Type p	er Benefic	iary					
Activity type	Part. 1 UEDIN	Part. 2 VU-IVM	Part. 3 KIT	Part. 4 UFZ	Part. 5 ULUND	Part. 6 EFI	Part. 7 Prospex	Part. 8 WCMC	Part. 9 TIAMASG	Part. 10 IEEP	Part. 11 UCD	Part. 12 CNRS	Part. 13 UP	Part. 14 ETH
		·	J.				را							
1. RTD/Innovation activities														
WP 2	41.00	15.00	9.00	10.00	15.00	0.00	0.00	0.00	0.00	0.00	9.00	32.00	33.00	5.00
WP 3	0.00	62.00	44.00	6.00	19.40	0.00	0.00	0.00	0.00	21.00	27.00	34.00	11.00	3.60
WP 4	21.00	6.00	0.00	0.00	20.00	53.00	0.00	23.00	16.00	24.00	3.00	0.00	6.00	38.00
WP 5	15.00	0.00	0.00	2.00	5.00	5.00	20.00	12.00	25.00	3.00	0.00	0.00	0.00	0.00
Total Research	77.00	83.00	53.00	18.00	59.40	58.00	20.00	35.00	41.00	48.00	39.00	66.00	50.00	46.60
									•					
2. Demonstration ac	tivities													
Total Demo	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3. Consortium Mana	gement act	tivities							-					
WP 1	44.00	4.00	4.00	0.00	4.00	4.00	0.00	4.00	0.00	0.00	0.00	0.00	1.00	0.00
Total Management	44.00	4.00	4.00	0.00	4.00	4.00	0.00	4.00	0.00	0.00	0.00	0.00	1.00	0.00
4. Other activities									_					
WP 6	9.00	0.00	0.00	0.00	4.00	0.00	0.00	2.35	12.00	0.00	0.00	9.00	0.00	5.00
Total other	9.00	0.00	0.00	0.00	4.00	0.00	0.00	2.35	12.00	0.00	0.00	9.00	0.00	5.00
		· · · · · · · · · · · · · · · · · · ·					[]							
Total	130.00	87.00	57.00	18.00	67.40	62.00	20.00	41.35	53.00	48.00	39.00	75.00	51.00	51.60

WT7: Project Effort by Activity type per Beneficiary

1. RTD/Innovation a	ctivities													
WP 2	15.00	5.00	12.00	12.00	0.00	0.00	0.00	2.00	10.00	13.00	0.00	14.00	13.00	0.00
WP 3	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.00	7.50	0.00	4.00	4.50
WP 4	14.00	0.00	0.00	0.00	6.00	29.00	10.00	24.00	3.00	0.00	0.00	6.00	4.00	0.00
WP 5	0.00	0.00	0.00	0.00	7.00	0.00	0.00	3.00	2.00	0.00	0.00	3.00	2.00	0.00
Total Research	34.00	5.00	12.00	12.00	13.00	29.00	10.00	29.00	15.00	19.00	7.50	23.00	23.00	4.50

2. Demonstration ac	tivities													
Total Demo	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3. Consortium Management activities														
WP 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Management	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

4. Other activities														
WP 6	10.00	3.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total other	10.00	3.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	44.00	8.00	12.00	12.00	13.00	29.00	10.00	29.00	15.00	19.00	7.50	23.00	23.00	4.50

WT7: Project Effort by Activity type per Beneficiary

Activity type	Part. 29 OPPLA	Total
1. RTD/Innovation activities		
WP 2	0.00	265.00
WP 3	0.00	255.00
WP 4	0.00	306.00
WP 5	0.00	104.00
Total Research	0.00	930.00
2. Demonstration activities		
Total Demo	0.00	0.00
3. Consortium Management activities		
WP 1	0.00	65.00
Total Management	0.00	65.00
4. Other activities		
WP 6	12.66	67.01
Total other	12.66	67.01

WT8: Project Effort and costs

Project Number ¹		308393	P	Project Acronym ²		OPERAs				
				Project efforts	and costs					
			Estimated	d eligible costs (wl	nole duration of	the project)				
Beneficiary number	Beneficia short nam	e Effort (PM)	Personnel costs (€)	Subcontracting (€)	Other Direct costs (€)	Indirect costs OR lump sum, flat- rate or scale- of-unit (€)	Total costs	Requested EU contribution (€)		
1	UEDIN	130.00	891,794.00	0 102,000.00	218,550.00	485,878.00	1,698,222.00	1,484,742.50		
2	VU-IVM	87.00	685,125.00	8,000.00	42,450.00	436,545.00	1,172,120.00	894,250.00		
3	КІТ	57.00	346,100.00	2,500.00	21,700.00	284,500.00	654,800.00	503,439.00		
4	UFZ	18.00	94,775.00	0.00	30,000.00	71,831.00	196,606.00	147,454.50		
5	ULUND	67.40	455,592.80	4,000.00	46,700.00	301,375.68	807,668.48	630,154.50		
6	EFI	62.00	403,356.00	4,000.00	21,000.00	391,254.00	819,610.00	628,862.00		
7	Prospex	20.00	188,000.00	2,500.00	157,000.00	207,000.00	554,500.00	416,500.00		
8	WCMC		326,000.00	89,963.04	88,185.60	248,511.36	752,660.00	646,260.00		
9	TIAMASG	53.00	216,000.00	0.00	17,150.00	139,890.00	373,040.00	276,660.00		
10	IEEP	48.00	300,653.00	3,400.00	16,800.00	306,666.00	627,519.00	471,489.00		
11	UCD	39.00	210,600.00	0.00	25,650.00	141,750.00	378,000.00	283,500.00		
12	CNRS	75.00	358,575.00	2,500.00	52,250.00	246,495.00	659,820.00	514,761.00		
13	UP	51.00	249,125.00	0.00	30,000.00	167,475.00	446,600.00	336,200.00		
14	ETH	51.60	227,659.20	0.00	19,950.00	148,565.52	396,174.72	306,654.50		
15	WWF Bulga	ar 44.00	66,616.00	7,500.00	25,400.00	18,403.20	117,919.20	76,143.60		
16	WWF Roma	ani 8.00	16,656.00	0.00	13,750.00	6,081.20	36,487.20	29,839.20		
17	SGM	12.00	55,476.00	0.00	16,200.00	43,005.60	114,681.60	86,011.00		
18	FFCUL	12.00	38,784.00) 11,000.00	14,200.00	31,790.40	95,774.40	71,830.00		
19	ECM	13.00	77,298.00	0.00	4,550.00	49,108.80	130,956.80	98,217.60		
20	BIOTOPE	29.00	157,064.00	0.00	10,150.00	33,442.80	200,656.80	150,492.00		

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WT8: Project Effort and costs

			Estimated	eligible costs (wh	nole duration of t	he project)		
Beneficiary number	Beneficiary short name	Effort (PM)	Personnel costs (€)	Subcontracting (€)	Other Direct costs (€)	Indirect costs OR lump sum, flat- rate or scale- of-unit (€)	Total costs	Requested EU contribution (€)
21	IODINE	10.00	72,920.00	0.00	3,500.00	45,852.00	122,272.00	91,704.00
22	Denkstatt	29.00	75,400.00	0.00	10,150.00	30,160.00	115,710.00	86,782.00
23	CIFOR	15.00	80,250.00	0.00	22,750.00	22,470.00	125,470.00	94,102.50
24	CSIC	19.00	84,968.00	0.00	28,650.00	100,282.00	213,900.00	160,425.00
25 (TERMINATED)	UEA	7.50	40,760.65	0.00	2,026.03	25,672.01	68,458.69	51,344.02
26	ALU	23.00	117,000.00	0.00	14,832.00	79,099.20	210,931.20	158,198.40
27	UBO	23.00	117,000.00	0.00	14,831.00	79,098.60	210,929.60	158,197.20
28	UNEXE	4.50	34,239.35	0.00	2,173.97	21,847.99	58,261.31	43,695.98
29	OPPLA	12.66	75,960.00	0.00	7,373.33	16,666.67	100,000.00	100,000.00
	Total	1,062.01	6,063,747.00	237,363.04	977,921.93	4,180,717.03	11,459,749.00	8,997,909.50

1. Project number

The project number has been assigned by the Commission as the unique identifier for your project. It cannot be changed. The project number **should appear on each page of the grant agreement preparation documents (part A and part B)** to prevent errors during its handling.

2. Project acronym

Use the project acronym as given in the submitted proposal. It cannot be changed unless agreed so during the negotiations. The same acronym **should appear on each page of the grant agreement preparation documents (part A and part B)** to prevent errors during its handling.

53. Work Package number

Work package number: WP1, WP2, WP3, ..., WPn

54. Type of activity

For all FP7 projects each work package must relate to one (and only one) of the following possible types of activity (only if applicable for the chosen funding scheme – must correspond to the GPF Form Ax.v):

• **RTD/INNO =** Research and technological development including scientific coordination - applicable for Collaborative Projects and Networks of Excellence

- DEM = Demonstration applicable for collaborative projects and Research for the Benefit of Specific Groups
- **MGT** = Management of the consortium applicable for all funding schemes
- OTHER = Other specific activities, applicable for all funding schemes
- COORD = Coordination activities applicable only for CAs
- SUPP = Support activities applicable only for SAs

55. Lead beneficiary number

Number of the beneficiary leading the work in this work package.

56. Person-months per work package

The total number of person-months allocated to each work package.

57. Start month

Relative start date for the work in the specific work packages, month 1 marking the start date of the project, and all other start dates being relative to this start date.

58. End month

Relative end date, month 1 marking the start date of the project, and all end dates being relative to this start date.

59. Milestone number

Milestone number:MS1, MS2, ..., MSn

60. Delivery date for Milestone

Month in which the milestone will be achieved. Month 1 marking the start date of the project, and all delivery dates being relative to this start date.

61. Deliverable number

Deliverable numbers in order of delivery dates: D1 - Dn

62. Nature

Please indicate the nature of the deliverable using one of the following codes

 \mathbf{R} = Report, \mathbf{P} = Prototype, \mathbf{D} = Demonstrator, \mathbf{O} = Other

63. Dissemination level

Please indicate the dissemination level using one of the following codes:

• PU = Public

- PP = Restricted to other programme participants (including the Commission Services)
- RE = Restricted to a group specified by the consortium (including the Commission Services)
- CO = Confidential, only for members of the consortium (including the Commission Services)

• Restreint UE = Classified with the classification level "Restreint UE" according to Commission Decision 2001/844 and amendments

• **Confidentiel UE =** Classified with the mention of the classification level "Confidentiel UE" according to Commission Decision 2001/844 and amendments

• Secret UE = Classified with the mention of the classification level "Secret UE" according to Commission Decision 2001/844 and amendments

64. Delivery date for Deliverable

Month in which the deliverables will be available. Month 1 marking the start date of the project, and all delivery dates being relative to this start date

65. Review number

Review number: RV1, RV2, ..., RVn

66. Tentative timing of reviews

Month after which the review will take place. Month 1 marking the start date of the project, and all delivery dates being relative to this start date.

67. Person-months per Deliverable

The total number of person-month allocated to each deliverable.

PART B

COLLABORATIVE PROJECT

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B1. Concept and objectives, progress beyond state-of-the-art, S/T methodology and work plan

B1.1 Concept and project objective(s)

Ecosystems provide humankind with a range of beneficial resources, goods and services. Yet human use and exploitation of the biosphere is increasing at such a pace and scale that many of the major ecosystems are threatened, and may not be able to continue to function in ways that are vital to support the existence of humanity. Re-framing environmental resource use has led to the emergence of the concepts of ecosystem services (ES) and natural capital (NC). This discourse indicates not only a change in our understanding of functions at the ecosystem scale, but also a fundamental shift in how we perceive the relationship between people and the ecosystems on which they depend. Although the ES and NC concepts have been adopted in high-level policy frameworks, e.g. the Convention on Biological Diversity (CBD) and the EU biodiversity strategy, a mismatch still exists between the wealth of conceptual understanding in science, the diversity of different academic approaches, and the practical application of this knowledge in policy and decision-making practice. New research is required to explore whether, how and under what conditions these concepts and currently disparate lines of research can move beyond the academic domain towards practical implementation in support of sustainable ecosystem management. OPERAs (Operational Potential of Ecosystems Research Applications) aims to improve understanding of how applying ES/NC concepts in managing ecosystems contributes to human well-being in different socialecological systems in inland and coastal zones, in rural and urban areas, related to different ecosystems including forests and fresh water resources.

Our mission and major challenge is to bridge the domains of science and practice. We propose OPERAs will advance understanding of ecosystem functioning and its relationship with ES provision and NC, by testing and further developing methods that assign values to the flow of ES from the stock of NC, and by establishing what constitutes good ES/NC governance and associated ecosystem management. Our analyses will lead to the development of new instruments to operationalise the ES/NC concepts, which will be constructed in direct partnership with relevant policymakers and stakeholders and tested in exemplar case studies. The project will communicate to ecosystem practitioners through a Resource Hub (CP) and associated Community of Excellence (CoE) that will ensure the perennity of the project outcomes. Through ground-breaking science, a systematic approach to stakeholder and user engagement and the development of new policy relevant tools and instruments, OPERAS will contribute to the effective and efficient management of ES and the underlying stock of NC while preserving their ecological value and biological diversity and enhance EU competitiveness through innovation.

OPERAS will achieve this ambition through the following project objectives:

1. Improve scientific knowledge and understanding of how multiple drivers and existing and foreseen ecosystem management under EU regulatory frameworks change ES/NC:

- a) OPERAS will establish a validated benchmark or baseline scenario of the current knowledge base related to the impacts of multiple drivers of ES change in the context of EU directives and governance systems;
- b) OPERAS will identify critical thresholds (tipping points) to ecosystem functioning and corresponding NC/ES delivery, taking into account uncertainties in the current quantification and valuation methods across multiple spatial and temporal scales.

- A report on standardized techniques and metrics/indicators for monitoring and valuing the efficiency of measures to sustain ES/NC (D3.1, D3.2, D3.4, D3.5)
- A meta-analysis and report on knowledge gaps and the demand for instruments that operationalise the ES/NC concepts (D2.1, D2.2)
- An assessment of existing and emerging policy needs and opportunities at EU and MS levels for the integration and uptake of the ES/NC concepts for different stakeholders, responding to policy needs and realizing opportunities (D4.1, D4.2)
- A Summer School for post graduate research on ES/NC operationalisation (D6.5)

2. Explore, demonstrate and validate mechanisms, instruments and best practices that will serve to maintain and enhance a sustainable flow of a broad range of services from ecosystems while preserving their ecological value and biological diversity:

- a) OPERAS will develop existing and novel policy instruments and best practices that serve to maintain and enhance a sustainable flow of a broad range of ES while preserving the stock of NC, including ecological and biological diversity;
- b) OPERAS will screen, evaluate and demonstrate these instruments and develop best practice in various 'exemplar case studies' at multiple scales and in different contexts through an interactive, adaptive-learning approach with key policymakers and stakeholders.

Measurable project outcomes are:

- A suite of decision trees to help stakeholders and beneficiaries decide on the best instruments and tools to govern and maintain ES/NC in different contexts (D2.5)
- An analysis of mainstreaming instruments in Green Infrastructure implementations (D3.5)
- An analysis of mainstreaming instruments in PES, Offset and related implementations including Green Business and Finance implementations (D3.4)
- A report on the design and 'success' criteria in implementing the ES/NC concepts (D3.7)

3. Further qualify and quantify the trade-offs and synergies between ecosystem traits and functioning, associated ES/NC and their social and economic values in Europe and globally:

- a) OPERAS will provide improved operational methods to quantify, map, value and visualise trade-offs and synergies between ecosystem traits underlying ES/NC and their socio-economic values;
- b) OPERAs will identify spatial and temporal (in)congruities across European regions and ecosystems;
- c) OPERAs will make available data and information accessible to policy and decision support in multi-layered GIS environments.

- A report identifying and describing enhanced methods for the analysis of trade-offs that account for differences in alternative ES/NC perspectives (ecosystem function, monetary value and social value) (D4.3)
- An evaluation of trade-off methods in different socio-economic contexts in exemplar case studies (D2.3, D2.4)

- A report on the integration of strategies and methods for social and cultural valuation to protect ecosystem services, including new tools and/or modifications to existing tools (D3.5)
- Guidelines for the translation of market and non-market values into payments for ecosystem services (D3.2, D3.4, D3.7)

4. Improve and modify existing integrated decision-support tools and instruments to better capture and represent the concepts of ES/NC:

- a) OPERAs will investigate the strengths and limits of current quantification and valuation methods and how these are best applied to both scientific and policy instruments for the ES/NC concepts;
- b) OPERAs will produce best practice guidelines to support policy and decision making;
- c) OPERAs will add practice examples through the exemplar studies to the existing stock of studies that illustrate innovative applications of the ES/NC concept in existing decision-support tools and that help inform instrument choices and applications in different contexts.

Measurable project outcomes are:

- A common practical framework and recommendations for ES/NC valuation and accounting, including a set of transferable GIS-based value functions (D2.5)
- A synthesis report documenting the operational potential of ES/NC instruments, including road maps for actions in different policy fields (D2.5, D3.7)
- Good practice guidelines for instrument choice and tutorials for instrument applications (D4.5)
- A report compiling the testing of instruments and best practice in 11 exemplar case studies (D2.1, D2.3, D2.4)

5. Provide policymakers and stakeholders with transparent and clear guidelines on improved effective and cost-efficient multi-level ES/NC governance structures and practical management measures:

- a) OPERAs will develop insight into trade-offs between different, and often disconnected, region-specific and/or sector-specific policy and governance systems;
- b) OPERAs will establish guidelines to avoid unintended leakage and spill-over effects of ES/NC-based strategies;
- c) OPERAs will explore synergies across sectors and governance levels.

- Recommendations for the integration of ES/NC in existing accounting and reporting formats at national and EU level (D3.4)
- Assessment of existing and potential governance modes for various ES/NC, including a typology of appropriate modes of governance, an analysis of major gaps in scientific knowledge and policy instruments, the role of property rights, and options for policy integration and mainstreaming (D3.3, D3.6)
- A comprehensive report on stakeholder workshops and on stakeholder engagement monitoring and corrective action (D5.7)

6. Develop, apply and test protocols to generate consistent and coherent spatially and temporally sensitive bio-physical and socio-economic ES/NC datasets and policy indicators:

a) OPERAs will develop and employ advanced information updating mechanisms and associated data tools and accounting frameworks that operationalise the ES/NC concepts at multiple scales (global, European and at the level of the 'exemplar' case studies) and in different contexts.

Measurable project outcomes are:

- An annotated inventory and classification of information tools/instruments, their sources, users and features, with a report describing to what extent existing decision-support tools and methods are able to cope with the ES/NC concepts (D4.4, D4.6)
- A report summarizing the improvement in existing decision support tools and methods and new user interfaces (D3.7, D4.7,)
- 7. Ensure the long-term perennity of key databases and other major products of the research:
 - a) OPERAs will collect best practice examples, decision-support and a range of ES/NC instruments in a Resource Hub (CP),
 - b) OPERAs will provide broad outreach through the Community of Excellence (CoE) of continued practice through a clearinghouse mechanism.
 - c) OPERAs will embed the CP as an information portal in relevant global networks such as the Ecosystem Service Partnership and IHDP/IGBP core-projects ensuring perennity beyond the life of the project;
 - d) OPERAs will use the CP to link existing knowledge and practice networks that allow the full range of ES/NC projects and networks inside and outside the consortium to join the CoE for continued practice, extending the knowledge base of ES/NC instruments, assessments and their evaluation.
 - e) OPERAs will provide innovative instruments and products developed by the project through the Resource Hub so that SMEs and other businesses can deploy these, adding value to their operations and to the sustainable economy.

- An operational Resource Hub with full functionality and accessible materials (D5.1, D5.2, D5.4, D5.5)
- Documentation and user guidance for new methods, databases and tools that are transferred to and made available through the Resource Hub (D4.5, D5.3)
- A perennity plan (business plan) for the continued exploitation of the project outcomes (D5.3, D5.6)
- Policy briefs, following the launch of the Resource Hub (D6.1, D6.3)
- Short films in the Resource Hub promoting OPERAs and describing the instruments (D6.2, D6.4)
- Peer-to-Peer exchange conference, exemplars and the Resource Hub (D6.6)
B1.2 Progress beyond the state of the art

Overview of the problem

The growing appreciation of nature as a capital, and the multitude of ecosystem services that flow from this capital to society, has spurred the need for the ecological, economic, and social sciences to develop methodologies with the capability to (i) describe and quantify types of ES at a given location and point in time, and (ii) assess their multiple values to humans both from a monetary/economic and a larger socio-cultural perspective (Carpenter et al., 2009). Clearly, the utilisation of different ES can lead to conflicts : provisioning services such as food or wood production in a growing global population are most efficiently achieved in an intensively used landscape, but this can conflict with the maintenance of high species and habitat diversity, or with fresh-water quality. Natural capital of an ecosystem from a climate regulating perspective, for instance in its functioning as a carbon sink, often goes hand-in-hand with supporting conservation of (semi)natural systems and biodiversity, but hinders urbanisation, expansion of new agricultural areas or areas for recreation. These are just a few examples highlighting that the management of ecosystems and the larger landscape to which they belong and which they help shape requires a thorough understanding of ecological and biophysical ecosystem functioning, methods to assign socio-economic values to the variety of dependent goods and services, and existing property and management regimes in order to promote good governance.

However, a robust assessment of ES/NC and how this concept can be best applied to enhance human welfare is hampered by the lack of basic knowledge about how biophysical, social and economic drivers interact in the coupled socio-ecological system . A particular challenge is to account for the ES/NC concepts in an environment that is not static, but changes rapidly both locally and globally through system feedbacks and tipping points. A value (economic, cultural, or both) assigned to an ecosystem based on present-day considerations might be quite different to an assigned value for which the ecosystem's functioning and services are considered over a longer time-period. Land use change decisions that contribute to greenhouse gas value (GHGV) serve as an illustration of this. Since many GHGs remain in the atmosphere for decades to centuries, estimates of the GHGV depend not only on immediate changes in, e.g., carbon pools when one ecosystem is replaced by another, but also on the potential future carbon uptake of the new ecosystem over a given period of time, and the probable GHG exchanges from disturbance and GHG exchanges other than CO₂ in the same period. Moreover, local decisions on the use and management of a set of ecosystems can have implications for the delivery of ES elsewhere as a result of teleconnections originating from the flow of water, air or trade in commodities . This poses the challenge of how to quantify and value NC and the resulting services at different spatial and temporal scales, in a geographically explicit way, and how to develop instruments and governance structures that account for these interactions across administrative and national boundaries.

Embedding the effects of timescale and uncertainties in the quantification of ES and the values assigned to them has not been achieved when guiding decision-making in an operational context. In theory, uncertainty can be represented via the assumption that a system has a number of possible states, each state having a known probability of occurrence. In practice, the information required to determine the possible states and their likelihoods quantitatively is often absent. Individual communities have begun to develop methods to address uncertainty from a number of different perspectives, but how to best apply these methods in the assessment of ES/NC is still unresolved. For operationalizing instruments based on quantitative assessments of ES, new methods for assessing and communicating these uncertainties are critical.

Different arguments can be used to promote and implement an ES based strategy. These may relate to the sustained functioning of ecosystems and the protection of the biodiversity of these systems based on the argument that ecosystem function will provide a sustained flow of multiple services

that support human well-being. Other arguments do not relate to ecosystem function directly, but focus on the economic welfare (monetary and non-monetary) values of the provided services allowing cost-benefit analysis to support the need for the continued supply of these services. However, monetary economic values alone are insufficient to fully reflect the social costs and values associated with ecosystem services. Thus, social and cultural values add yet another dimension to arguments for implementing ES based management and policy. Mainstreaming ecosystem services for implementation requires attention to all these different arguments in the process of assessment and implementation. While a number of studies have investigated to what extent conflicts arise between these alternative arguments, especially focussing on differences between biodiversity objectives and ecosystem service provision, structured analysis of the synergies and trade-offs between these different perspectives is lacking (Seppelt et al., 2011).

How policy and regulatory frameworks in the EU use the ES/NC concepts.

Within the EU, ES/NC is governed by a complex framework of Community and Member State instruments including EU Regulations and Directives, national policies and legislation implementing the Community instruments, and a range of national, regional and local instruments. In general, Article 3 of the Lisbon Treaty provides a relatively solid basis for EU action on the conservation and sustainable use of ES/NC, both within Europe and globally. However, the extent to which ES/NC are – and will be - governed by the EU and/or Member States varies between sectors. The EU has exclusive competence over agriculture and fisheries under the Common Agricultural Policy (CAP) and Common Fisheries Policy (CFP), but little or no formal authority over land-use, spatial planning and forest policy. This has implications regarding the management of different ES/NC at the EU level, e.g. the integration of ES/NC into the relevant policy and regulatory frameworks.

Several existing EU policy instruments support the conservation and sustainable use of ES/NC including the Birds and Habitats Directives, which protect the "biodiversity baseline" underlining all ES/NC, the Water Framework Directive (WFD), which promotes 'good ecological status' of aquatic ecosystems, and Marine Strategy Framework Directive (MSFD), which aims to secure sustainable, ecosystem-based management of marine goods and services. At the national level, ES/NC concepts (or aspects of these concepts) are increasingly integrated into the policies steering biodiversity conservation and sustainable resource use. However, the existing policy and regulatory frameworks for ES/NC remain far from optimal with the implementation of existing policy instruments less successful and effective than anticipated. The majority of the instruments – such as CAP, CFP and national forest policies - are still primarily focused on regulating the ecosystems from the point of view of natural resources, rather than addressing the full range of ES/NC. Furthermore, the governance frameworks - both at the EU and national level -remain hierarchical and sector oriented and therefore unable to tackle several cross-sectoral issues characteristic of the management of ES/NC (e.g. involving and engaging all stakeholders benefiting from ES/NC). Finally, ES/NC are poorly integrated into the monitoring and accounting systems underpinning the development, implementation and assessment of EU and national policies (e.g. national accounts).

Consequently, work is needed to assess EU frameworks for sustainable ES/NC management and to explore more effective ways forward. Given the mixed and/or shared competences between the EU and the Member States, the most effective policy and regulatory frameworks for ES/NC are likely to build on leadership in the areas of Community competence and on the development of effective EU support mechanisms for Member State actions. Effective integration is needed to minimise the damage to ecosystems caused by sectoral activities and to maximise the positive contribution of these activities to conservation objectives. Finally, there is a need to explore the development of more innovative, flexible and/or adaptive policies, policy instruments and governance models (e.g.

tools supporting their implementation) that can address ES/NC in a comprehensive and effective manner.

OPERAs will go beyond the state of the art by contributing to the better design and deployment of a mix of policy instruments, including direct regulation and economic policy instruments, within the context of various governance and institutional structures. This includes enhancing governance and institutional structures with the implementation of an integrated ES/NC approach.

Socio-ecological systems, ES/NC models and trade-offs.

ES research has emphasised the need for ecosystem management and policy decisions that focus on ecosystem functioning and the multiple ecosystem services that flow from it, and requires an assessment of relevant trade-offs and synergies among services. While trade-offs can constrain human enterprise, synergies offer opportunities for multiple benefits fulfilling several demands from society simultaneously. The existence of critical trade-offs and thresholds, tipping points at which ecosystems may transform into different stages, has long been known to ecologists, but the fundamental ecological mechanisms are less well understood. Using a combination of observation studies and simulation experiments, progress has been made in quantifying functioning of ecosystems in terms of biophysical services - for instance, carbon sink strength or freshwater balances - but these advances are, so far, largely restricted to the academic user. At the same time, the relationships between biodiversity and ecosystem functions have rarely been investigated in a structured way for larger geographic areas , and only a few studies have demonstrated that increasing the number of species sustains an increasing number of ecosystem functions .

Thus research is needed to understand the complementary benefits that arise from considering manifold ES provision, including biodiversity conservation, that can be achieved with ecosystem management that considers protected areas and green infrastructure policies. Although rapid progress has been made on methods to quantify and map ES, current quantification methods often lack the capacity to describe how, when and where an ES is delivered, and how the relative magnitude of a given service, compared to all services in a system, will change in response to human management, climate change or air pollution. Moreover, assessments of the effects a change in ecosystem functioning has on the associated ES will depend on the time-period considered and must also account for potential effects elsewhere (indirect spatial effects). Progress in this field hinges on our capacity to quantify the dynamics of ecosystem services from local to global scales in metrics that can serve as the basis for valuation methods, and that are accessible to practitioners. Because of the multi-scale nature of the processes involved in ecosystem functioning, most ecosystem services cannot be observed directly, leading to challenges with respect to the monitoring and validation of operational instruments and the analysis of the dynamics in services and trade-offs . Furthermore, there is a need to address issues of validity, sensitivity and uncertainty in monitoring and modelling approaches in order to acquire legitimacy in applying these methods to real-world situations. Decision-making needs to consider probabilities or uncertainties in outcomes, and hence needs quantification of uncertainties in the information that forms the basis for those decisions. Such an approach is especially important when developing responsible management that considers the risk of a tipping point to be reached: a precautionary approach is needed since ecosystem tipping points cannot yet be predicted with the required precision. If not properly assessed and reported, instruments based on ES quantification will be subject to doubts and lack credibility.

A prerequisite for the design of integrated, effective and efficient conservation strategies is a solid knowledge base of characteristic trade-offs and thresholds across spatial and temporal scales, and research on the synergies and trade-offs for different pathways that operationalise the ES/NC concept. While the literature on monitoring, modelling and valuing ES at multiple scales has grown considerably, there is a need to link valuation processes to the understanding of ecosystem function

and to link scientific achievements to the needs of practice through operational methods and instruments (Ash et al., 2010). The limits of social and monetary valuation approaches for operational environmental management need to be clarified and the impacts on ecosystem function assessed across space and time.

OPERAS will go beyond the state of the art by identifying the knowledge gaps from recent reviews that highlight the main stumbling blocks for operationalization of the ES/NC concepts and by targeting new research at the knowledge needs of policymakers and practitioners. This will enhance and consolidate the credibility and legitimacy of science approaches in support of the deployment of policies and instruments based on the ES/NC concepts.

Economic and social ES valuation.

The rapidly expanding ES valuation literature highlights how stocks of NC yield flows of services, which either directly or in combination with other inputs (such as man-made and human capital) generate benefits realised through both consumptive and non-consumptive use and non-use values. Although there is a firm theoretical basis for the ES approach, there has been relatively little practical implementation of these principles to applied decision making (Ash et al., 2010). Implementation requires that natural and social science knowledge regarding ES/NC be integrated within the process of decision making for optimum sustainable wellbeing. However, the natural sciences are often unable to produce the information required for economic and social analyses, while economic analyses are often based on non-contextual and oversimplified models of the underlying biophysical processes. Moreover, while methods to assess the monetary value of nonmarket goods have advanced, their application to ES requires further development and in some cases remains contentious, especially in the assessment of non-use (existence) values of ES provision. Attempts have been made to 'quantify' social values via qualitative data, mostly using stakeholder perception, modelling or scenario analyses focusing on how communities can apply local (traditional) ecological knowledge in collaborative social decision-making processes, but many gaps remain. Understanding how communities perceive ES is an emerging field for establishing values. However, a number of practical problems remain such as the translation of such values into practical or operational applications. Thus, while apparently inextricably bound together, an operational link between ES/NC and social capital networks and institutions has never been attempted in practical terms.

Maintaining sustainable levels of ES provision, now and in the future, is also limited by the translation of non-market values into adequate pricing and payment mechanisms. Policy and decision-making are driven primarily by financial incentives for ES, which are traded in markets and for which market prices are available, even though existing incentive structures to maintain ES often do not reflect their full economic value (and opportunity cost) to society. The design and evaluation of cost-effective, incentive-compatible pricing and payment mechanisms such as Payments for ES (PES) is complicated because of information asymmetry between the principal rolling out the scheme and the agents adopting it . Lack of quantifiable objectives and adequate monitoring are among the barriers to assessing the cost-effectiveness and efficiency of different incentive mechanisms (Fischer et al., 2008).

OPERAs will go beyond the state of the art by exploring methods for accounting for the societal values attached to ES and will develop mechanisms to promote social learning and innovation with respect to the ES/NC concepts. OPERAs will further test the key institutional-economic terms and conditions needed for existing and new pricing and payment mechanisms to change behaviour towards sustainable ES management, and develop and apply these in practice in small-scale policy experiments together with ES managers.

European case studies, global scale connections and indirect effects.

Existing ES case studies have shortcomings such as poor stakeholder engagement, lack of biophysical realism and lack of quantification of off-site effects and trade-offs (Seppelt et al., 2011). Eastern Europe is poorly represented, and the coverage of the different ecosystems is uneven Nevertheless, there are many case studies from which to learn. The UK National ES Assessment, for example, has inspired research programs in other Member States . A framework for the incorporation of the ES approach into EU biodiversity conservation policies has been proposed and further research needs have been identified, but consistent analysis of the policy instruments used and their effectiveness is lacking. Thus, OPERAs will systematically review existing case studies to learn lessons from past experience in support of more innovative approaches.

Decisions and actions taken in Europe affect ES/NC, livelihoods and ecosystem function worldwide e.g. through climate change stabilisation targets, bioenergy strategies or EU fisheries policies. Understanding these effects, which are often ignored in existing policies, requires ecological characterisation of ES, but also clarity in the economic connections between biodiversity, ES/NC and food security. There is a great need to assess the unintended side-effects of environmental policies, and to identify the win-win strategies achieved by schemes such as Reducing Emissions from Deforestation and forest Degradation in Developing countries. Assistance to governments, farmers, forestry and fishery stakeholders in investment and management decision-making requires pertinent and operational metrics that consider the coupling of global trade-offs and the complex ES dynamics associated with changes in climate, international trade, land degradation, and coastal marine systems.

OPERAs will go beyond the state of the art by analysing these indirect, connected effects through a global-scale exemplar study, and the international dimension will be addressed by analysing studies from connected international networks, establishing an international Advisory Council and including international institutes as partners (CIFOR, WCMC).

Instruments, best practice, CoE and resource-hubs.

Recent reviews highlight the need for better instruments for ES assessment in support of coordinated, multi-scale stewardship of ES/NC. Integrating ES/NC concepts into governance and economic information systems is an emerging strategy, through the tools and instruments used to process and synthesise information needs for policy, planning, and community and business-based decision making. Many methods exist to inform and negotiate trade-offs across multiple value systems, including for example deliberative methods , value construction , cost-benefit and multi-criteria decision analysis, participatory Bayesian networks , foresight analysis, scenario analysis, network analysis and ARIES (Artificial Intelligence for ES), but their conversion into user-oriented tools requires adaptation to ES/NC management needs. The specific characteristics of the ES/NC concept and new knowledge about the possible synergies and trade-offs of alternative strategies require innovative approaches in addition to the extension, validation and calibration of existing approaches.

OPERAs will go beyond the state of the art by supporting and further developing tools for (a) information and knowledge transfer to empower an active stakeholder process, (b) interactive collaborative platforms such as tailored communities of excellence and best practice, (c) process-based approaches for decision making environments and patterns, and d) practical instruments such as certification schemes, auditing and accounting, benchmarking, Life Cycle Analysis (LCA), labelling and PES. ncertainty management, conceptually and for practical applications.

OPERAs response to knowledge gaps

The OPERAs project proposes research, demonstration and outreach activities that go beyond the state of the art of ES science and implementation. Table 1.2a summarises the major knowledge gaps and how OPERAs will address these.

Table 1.2a How OPERAs will address knowledge gaps

Knowledge gap	OPERAS will						
Address critical knowledge gaps in ES/NC science							
The need to better link ecosystem service values derived from the social and economic contributions to human well-being to the structure and function of the ecological system	Link the ecological dimensions of ES/NC with an analysis of social and economic well-being to address the synergies, conflicts and trade-offs that arise for different beneficiaries						
The need for ES science to move from static to dynamic approaches that account for feedbacks and tipping points in socio-ecological systems	Tailor new knowledge to the development of instruments that account for spatial and temporal dynamics, lags, tipping points and leakage of ES/NC and its drivers.						
The need to assess the unintended side-effects of environmental policies, and to identify the win-win strategies achieved by schemes such as UN-REDD+.	Analyse these indirect, connected effects through a global, multi-scale, ES/NC case study that tests policy and market instruments to both mitigate climate change and reduce habitat loss						
Help EU frameworks and directives to account	for the ES/NC concepts						
Existing EU policy and regulatory frameworks are less successful and effective than anticipated for the implementation of ES/NC policy instruments.	Analyze the effects of existing EU frameworks and directives in the context of various governance systems and institutional structures.						
The need to assess EU frameworks for sustainable ES/NC management and to explore more effective ways forward.	Identify how policy and regulatory frameworks, within different governance contexts, can better implement an integrated ES/NC approach.						
Use the ES/NC concepts and knowledge in oper	ational management and policy design						
The lack of capacity to operationalize scientific knowledge on ES/NC in support of the design and implementation of innovative public goods and sustainable economic activities	Identify knowledge gaps from recent reviews and a meta-analysis of current practice to pinpoint barriers for policymakers and practitioners in operationalizing the ES/NC concepts.						
The design and evaluation of cost-effective, incentive-compatible pricing and payment mechanisms such as PES is difficult because of information asymmetry between the principal rolling out the scheme and the agents adopting it.	Test the key institutional-economic terms and conditions needed for existing and new pricing and payment mechanisms to change behaviour towards sustainable ES management						
Include stakeholders and practitioners in a ES/NC concepts	joint learning process to operationalise the						

The lack of quantifiable objectives and Develop and apply innovative ES-based public

adequate monitoring in assessing the cost- effectiveness and efficiency of different incentive mechanisms.	goods and pricing mechanisms in practice in small-scale policy experiments with ES managers						
The need for better ES/NC assessment instruments in support of multi-scale stewardship of ES/NC, including their integration into governance and economic information systems	Support information and knowledge transfer to empower an active stakeholder process and develop approaches for different decision making contexts						
The lack of pertinent and operational metrics for investment and management decisions that consider trade-offs and complex ES/NC dynamics arising from changes in climate, trade, land degradation, and coastal-marine systems.	Address the international dimension by including studies from connected international networks, a global-scale exemplar, establishing an international 'Advisory Council' and working with international partners (WCMC and CIFOR)						
Many methods exist to inform and negotiate trade-offs across multiple value systems, but their conversion into user-oriented tools requires adaptation to ES/NC management needs.	Further develop instruments such as certification schemes, auditing and accounting, benchmarking, Life Cycle Analysis, labelling and PES, and interactive collaborative platforms tailored to a Community of Excellence and best practice						
Create platforms for sharing knowledge, experience and tools beyond the project lifetime							
The need for innovative approaches and the application of existing methods that use new knowledge about synergies and trade-offs in alternative ES/NC management strategies	The development of a Resource Hub to collect, categorise, harmonise, synthesise and tailor and adapt instruments and data for the multiple demands of user groups in managing ES/NC						
ES/NC knowledge is dispersed throughout multiple research networks and initiatives in Europe and worldwide	Develop a Community of Excellence that takes stock of the knowledge within different networks with a focus on ES/NC, including ESP.						

B1.3 S/T Methodology and associated work plan

B1.3.1 Overall strategy and general description

The aim of enhancing European sustainable use of ecosystems by operationalising the ES/NC concepts requires a highly interdisciplinary approach and a new level of engagement of scientists with practitioners that goes beyond consultation and knowledge transfer. Experimentation, learning-by-doing, demonstration, and experience sharing will drive an iterative approach of assessing practical needs, generating innovative knowledge through cutting edge ES/NC science, and developing processes, tools and instruments that address gaps in current ES/NC management practice. To achieve this, OPERAs starts from current experience of bringing the ES/NC concept into practice, where a meta-analysis of existing ES/NC practice will identify knowledge gaps and requirements for new policy options and instruments. The term 'instruments' is used here in the broadest sense to include policy instruments, information tools (e.g. databases and visualisation) and market-based instruments such as auditing, certification and PES schemes as well as innovative

Alternet, GLP, IPBES and others

products based on ES. New insights, and improved or novel tools and instruments, will be tested in practice in exemplar case studies (hereafter termed 'exemplars') Subsequent iterations will then enhance scientific theory and refine the instruments. Throughout this iterative process, outreach will be achieved by bringing available resources and tools together in the CP, a web-based portal that will be co-developed by scientists and practitioners representing different interests and perspectives on the development, communication and implementation of the ES/NC concepts. The CP will provide the main interface between OPERAs and the CoE for continued practice that will benefit from OPERAs outcomes. Professional stakeholder engagement and facilitation throughout will establish the CoE around OPERAs activities, and optimise the saliency and relevance of the research to the broader community of policy makers, key stakeholders and the wider public.

A critical element in the design of the OPERAS approach is the central position of 'practice'. The project is designed to overcome the frequently addressed failure of translating scientific knowledge

into operational practice (in policy, but also in business and society as a whole). This failure often results from scientific research being disseminated only towards the end of the Instead. OPERAs will use project. an innovative approach that starts with an analysis of current practice and the identification of knowledge and instrument needs that have been indicated by the successes and failures of existing efforts to operationalise the ES/NC concepts (see figure 1). These experiences will be translated into targets for the development of knowledge and instruments that facilitate the implementation, uptake and efficiency of ES/NC based management and policy. Specific requirements listed in stakeholder consultations in the exemplar studies will be accounted for as part of the same process. Through a process of

iteration, new insights and instruments will be tested in the exemplar studies, achieving a joint learning process for scientists and practitioners within a stakeholder context; successes and failures will trigger innovative developments



Figure 1 The OPERAS WPs allow for iterative exchanges between Practice, Knowledge and Instruments, and are focused on Outreach to a wide CoE.

and learning experiences will be translated into guidelines for implementation beyond the exemplars. The evolving collaboration between practitioners and scientists will form the basis of the CoE. The following sections describe how the design of OPERAS structured around four key workpackages (Practice, Knowledge, Instruments and Outreach) will create advances beyond the state-of-the-art.

WP1 Management

WP1 will coordinate and administer the project according to ISO 10006 standards. It will compile and produce periodic reports, review WP deliverables and communicate with the Commission, Advisory Council and other external parties. See section B2.1 for a complete discussion of the OPERAs management structure.

WP2 Practice: Ecosystem Service Practice

WP2 Practice will investigate systematically, in exemplar case studies, the use of ES/NC tools and instruments as well as developing guidance on their application in practice. WP2 Practice targets a wide audience of policymakers, on-the-ground practioners and researchers who seek to better understand and apply the ES/NC concept in their respective fields. The underpinning rationale of WP2 Practice is to address several operational voids that hamper efforts in realizing the full potential of the ES/NC concepts. These include: a) limited capacity to harmonize ES across diverse and different scales and contexts; b) challenges in capturing the details of ES dynamics in case-specific applications; and c) the need to develop effective means of communicating synthetic insights that influence both high level policy and on-the-ground ES/NC efforts.

The potential for a rapid escalation of research into ecosystem services emphasizes the need to set standards and guidelines for how the concept, and its terminology, is used. Additionally, ES/NC in research and practice inherently engages both biophysical and social science domains, so methods and instruments employing a wide range of scales and modes are often not easy to standardize. This context also makes it difficult to synthesize and incorporate insights from specific cases into broader guidance. As stated in the MA follow-up process (Ash et al., 2010), there is a need for a consistent framework for ES assessments based on documenting data, utilizing empirically tested hypotheses, models, and reporting of results and recommendations that can be a platform across different horizons. A recent meta-analysis of ES assessment studies reported on the problems of extracting and standardizing the necessary information from published studies (Seppelt et al., 2011), resulting in a proposed protocol on ES assessment (Seppelt et al., 2012), which is being utilized here. WP2 Practice is organized around three integrated Tasks:

Task 2.1 (Meta-Analysis) will analyze the use of instruments and processes in existing case studies, as well as in new Exemplars developed in this project, to generate a consistent database on the characteristics of ecosystem service assessments based on current knowledge and examples. The meta-analysis will target a wide range of ES/NC examples that emphasize the operationalization of the ES/NC concepts in practice. To support operationalization it is essential to assess measures of: i) efficiency to confirm the utility of the instruments employed; and ii) evidence to determine if the indicators used are valid for the respective ES/NC applications. From this, new indicators and ranking approaches will be developed and applied to the existing case studies. As in medical research, established indicators and tools are judged by a consistent ranking of evidence for their effectiveness from existing studies. This approach will also lead to assessments of the efficiency of instruments from published case studies to ensure sustainable use of ES/NC. Spatial scale will be the primary dimension through which the effectiveness and efficiency of indicators and instruments will be analyzed. It will be necessary to go beyond an analysis of the published material by conducting interviews with the main investigators of the case studies, and to explore some studies that may go beyond traditional ES/NS paradigms.

Task 2.2 (Exemplars) will expand the current ES/NC state-of-the-art by testing ES/NC instruments in new case study conditions, providing a continuous dialogue of first-hand experience across exemplars that span a wide range of environmental scales and social settings. Experience from testing tools and instruments in the Exemplars will enhance the information from the meta-analysis through detailed reporting and communication. The exemplars are selected to complement and extend the literature-based case studies evaluated in the Meta-Analysis (Task 2.1). As illustrated in Box 1, the exemplars embrace a wide range of scales (from global to local), biomes (forest, agriculture, floodplains, costal areas, marine, urban), policy targets (climate regulation, livelihood, urban sustainability, biodiversity, sustainable agriculture, coastal integrity), as well as tools, methods and instruments (including PES, economic valuation, spatially explicit ecosystem models, LCA, policy directives, green infrastructure, restoration activities, trade-off analysis, labelling and certification, and crowd-sourcing).

The exemplars are a carefully selected suite of applied cases, which will both inform the development of, and test the output from the other project WPs. The exemplars provide insight into the needs and requirements of practitioners, and an empirical testing ground to assess the applicability and the impact of ES/NC-based instruments. The outcome of this hands-on experience will then, in concert with the literature based Meta-Analysis, provide the knowledge base for the Synthesis. Progress and results from the exemplars will continuously be fed into the CP. Each geographic and social criterion was comprised of a number of measures, which allowed empirical ranking to select the final 11 exemplars. This process was designed to achieve two goals. First, the exemplars selected cover a wide range of scales, areas, ecosystem services, and management schemes. Secondly, the transparent process for exemplar selection allows for the participation of new stakeholders throughout the process, and facilitates the approach being replicated in other settings. Exemplars were selected in a transparent two-stage process with the first step ensuring the relevance of each of the exemplars within the final selection, and the second step ensuring the strategic complementarity of the final selection of exemplars. Potential exemplars were first ranked for five quality criteria:

- 1. Policy relevance
- 2. Ecosystem service provision thresholds
- 3. Fit with key project research questions
- 4. Illustration of tradeoffs
- 5. Potential for new or improved tool development.

Exemplars that passed this initial stage were evaluated for three geographic and three social criteria. The geographic criteria were: a) spatial scale, from local to global; b) geographic domain, to cover a diverse set of European situations; and, c) dominant land-use type, to ensure a diversity of ecosystem services. The social criteria were: a) relevance to EU directives and policy, to ensure a community of stakeholders involved in the study design and outcomes; b) diversity and types of stakeholders represented; and, c) dominant economic sector involved.

For cross-comparison, instruments will be tested in more than one case study exemplar, as well as testing multiple instruments in individual exemplars. Each exemplar will follow a BluePrint protocol (see below) to identify, develop, apply, evaluate, and report on ES/NC tools and instruments through continuous dialogue with stakeholders, decision-makers and practitioners, in collaboration with the WP4 Instruments. Cross-exemplar workshops will ensure an efficient horizontal information flow and stimulate synergies between the different exemplars.

Task 2.3 (synthesis and learning experience) will provide the overall architecture to integrate the across WP2 Practice and synthesize lessons-learned and best practice in the use of tools and instruments that maintain and enhance ES/NC across a range of scales and settings. Results from exemplars will feed into the meta-analysis database created for existing case studies. Thus, the results from the exemplars will be analysed and interpreted together with results from additional case studies, also derived from on-going projects under the same theme and additions from the growing CoE. This increase in sample size and replicates is expected to lead to more robust results, compared to an approach that relies only on a small number of case studies. It will, therefore, be possible to derive generalisable lessons learned on how to operationalize the ES/NC concepts. In addition, evidence-based recommendations will be made about instrument choices that are optimal for specific aims and scales.

A BluePrint Protocol will serve as the backbone analytical tool to underpin and integrate across the WP2 Practice Tasks, as illustrated in Table 1.2b. While the structure of the BluePrint will be fixed for the duration of the project, some flexibility will enable the inclusion of additional attributes as new knowledge emerges. For Meta- Analysis, the BluePrint will provide the basis to compare results from different, existing studies. For the Exemplars, the BluePrint will provide the

methodological basis for empirical data collection and information gathering for new case studies. For Synthesis, the BluePrint will provide the key framework from which lessons learned across WP2 Practice will be communicated and linked to WP3 Knowledge, WP4 Instruments, WP5 Resource Hub and WP6 Outreach.

BluePrint stages	Reporting topics	Delivery in OPERAs				
1. Purpose and design	 Rationale, scope Threats, ES targets					
2. Problemscape	 Socio-Environmental system ES characterization Policyscope Future scenarios 	BluePrint baseline Reports (Month 12)				
3. Analysis and Assessment	 Biophysical-Cultural indicators, inventories Model criteria, robust 	Annual BluePrints Reports (Month 24, 36, 48)				
4. Results and Recommendations Outreach	 Trade-offs on/offsite Flows, sources, sinks Policy suitability Case-practice reality 	Final Blue Print				
5. Monitoring	 Change indicators Instrument options Monitoring frequency 	Report (Month 54)				

Table 1.2b BluePrint Protocol for WP2 Practice (adapted from Seppelt et al. 2012) Protocol for WP2 Practice (adapted from Seppelt et al. 2012)

Box 1. A brief description of the Exemplar case studies

1. Urban-rural fringe of the Greater Dublin Region. Investigating the potential of incorporating ES/NC factors into the planning and management of expanding cities, with special emphasis on green infrastructure and green innovation. A key issue is the critical thresholds between the provisions of rural versus urban ES, common to all European cities.

2. Urban dunes in Barcelona. Investigating the multi-dimensional value of urban dunes based on the ES/NC concepts to enhance cost-effective management with multiple co-benefits, e.g. storm protection and urban/peri-urban recreation.

3. Conservation of cultural landscapes in the LTER region of Montado in Portugal. Using the ES/NC concept to combine the practice, productive, ecological as well as cultural aspects of socioecological systems to promote improved management of cork trees. Key issues are the effects of climate change, land management and pollution in pushing Montado landscapes toward economic and ecological tipping points.

4. **Co-beneficiary management of marine/coastal ecosystems for Blue Carbon on the Balearic Islands.** Using the ES/NC concepts to quantify the potential and security of the Blue Carbon sink in seagrass meadows by evaluating the co-benefits of management plans. The policy context is key including the EU Habitats Directives, the Framework Directive on Water and the Marine Strategy.

5. Trans-boundary River and Wetland Management of the Lower Danube. Investigating how the ES/NC concepts will be used to estimate direct and indirect socio-economic benefits, such as flood mitigation, enhancement of water quality, fishing grounds, and carbon sequestration, across the Romanian-Bulgarian border. This exemplar will optimize the management and governance of a site supported by the WFD and the Habitats Directive.

6. Effects of landscape management and infrastructure development on rural and peri-urban areas of the central Alps. Investigating the integration of ES/NC concepts into planning documents and the permit process for infrastructure and peri-urban development. A key issue is to promote cross-sectoral dialogue that optimises land use and management decisions (e.g. agriculture, forestry, tourism and hazard mitigation) including spatial trade-offs between up- and downhill beneficiaries, leading to insights into best practice in governance structures.

7. Wine production and cultural landscapes in Europe. Investigating how to communicate responsibly grown and made wines to consumers, including assessing their impacts on ES/NC. This exemplar will further develop, implement, and test two existing instruments to assess life-cycle impacts of vineyard practices.

8. Multi-scale implementation of environmental policy in Scotland. Testing a variety of valuation tools and governance instruments with decision-makers and stakeholders applied to issues of land use change, marine stewardship and climate change, from community implementation to the national level. A key issue is the strong Scottish Government support in operationalising the ES/NC concepts.

9. Circum-Mediterranean agricultural land abandonment. Analysing policy options that reduce land abandonment and maintain the delivery of ES (i.e. agricultural products, risks of extreme events, semi-natural ecosystem integrity, water availability/runoff, carbon storage) while accounting for the Mediterranean's long legacy of land use history. A key issue is to support the identification of human livelihood risks, as well as the opportunities for sustainable use of ES/NC for Mediterranean people.

10. Pan-European regulatory Directives. Investigating policy conflicts and synergies in order to showcase operational methods that improve policy design using the ES/NC concepts. A key issue for EU directives is the trade-off between ecosystem services, leading to policy conflict as well as providing potential for synergies between directives and other policies.

11. Mechanisms for Climate Protection and Habitat Conservation at the global scale. Using a multi-scale ES/NC approach to test policy and market instruments for the twin goals of mitigating climate change and reducing habitat loss at the global scale. A key issue is to find balanced solutions that account for the multi-dimensional interactions between climate change, habitat loss and ecosystem functioning.

WP3 Knowledge: Ecosystem Service Knowledge

WP3 Knowledge will provide the scientific base to advance the development and implementation of instruments that operationalise and mainstream the ES/NC concepts in practice. This will be achieved by providing advances in scientific research that address knowledge gaps identified in recent reviews of practical ES/NC applications as well as emergent needs during the project lifetime. The research will supplement insight into the underlying mechanisms that link ecosystem function to service provision and values, using scientifically based methods for quantification and validation. It will also establish perspectives on the fit of the ES/NC concept with current institutional structures and governance systems. The main challenges for mainstreaming the ES/NC concepts in operational management relate to the various decision-making trade-offs that arise from (i) the multiple functioning and uses of ecosystems at a given location, (ii) the time period over which functioning and use are being considered, (iii) the effects of local decision making elsewhere and (iv) the different ways in which values are assigned to ES/NC. WP3 Knowledge will address these challenges by exploring innovative methods to further support the deployment of the ES/NC approach. In particular, research will address the multiple scales (geographic and in time) over which the ES/NC concepts operate and the multiple physical and socio-economic drivers that affect, and are affected by, ES. The five Tasks through which these challenges are addressed are:

Task 3.1 (Ecosystem function and quantification) will focus on identifying the implications of our understanding of the relationships between ecosystem functioning and the provision of ES, for quantifying, monitoring and modelling ES/NC. Innovative approaches and metrics will be developed to quantify ES/NC dynamics in response to management decisions made in the context of socio-economic change and EU regulatory frameworks. A specific focus will be the spatial and temporal dimensions and lags in service provision, including thresholds, and the ways in which these dimensions can be better accounted for in the development of instruments that apply ES/NC concepts. Moreover, the relationship between biodiversity and ES provision will be further analysed since confusion about the possible synergies and conflicts between biodiversity conservation and ES/NC based management often dominate implementation discussions. The application of knowledge in practice is often hampered by large uncertainties in monitoring and accounting methods. Thus, Task 3.1 will develop metrics to assess and communicate uncertainty levels in ES provision for use in information tools and decision support instruments.

Task 3.2 (social and cultural values of ES) will develop and test within the context of the exemplars new methods to measure the social and cultural values attached to ES, including deliberative, participatory approaches and approaches to capture cultural identities attached to ES/NC. Specific attention will be given to those services where existing economic valuation methods are ineffective. These include cultural services, with non-use values, in which underlying, often intangible social and cultural values play a major role. To what extent these values can inform the development of alternative ES/NC policy instruments and facilitate decision-making processes will be investigated to support instrument development that more fully accounts for the social and cultural values attached to ES/NC. Temporal and spatial dimensions will be addressed explicitly as social values tend to differ by social groups, region and change in time. Such analysis will also address critical thresholds in service supply as perceived by society.

Task 3.3 (market and non-market valuation) will explore the application and selection of methods for market and non-market valuation of the use and non-use values of ES/NC and the identification of beneficiaries and losers to quantify trade-offs between individuals and groups in society. The extent to which ES/NC are amenable to robust monetary valuation and the role these value estimates play in both Pricing and Payment schemes for ES will be explored in response to demands set by the development of operational instruments.

Task 3.4 (institutional structures and governance systems) will explore how ES/NC based approaches fit with current institutional structures and governance systems, and where unforeseen policy conflicts may occur. Conditions and recommendations for the design and deployment of a mix of policy instruments, including direct regulation, will be provided to enhance the fit of instruments in the context of the governance and institutional structures within which they are embedded. Recommendations for designing better governance and institutional structures will be provided to match these to an integrated cross-sectoral ES approach.

Task 3.5 (trade-offs and synergies between services and alternative perspectives) will compare and synthesize the different perspectives on the ES/NC concept. Task 3.5 will address how social, monetary and ecosystem or biodiversity based perspectives of ES/NC coincide or conflict, and how these different perspectives will affect the design and implementation of instruments, and the outcomes of ES based governance. Task 3.5 will also identify both generic and context-specific synergies and trade-offs between different ES and evaluate/enhance the methods available to account for these trade-offs in operational management, including precautionary principles arising from potential tipping points.

WP3 Knowledge will build on internationally-established, modelling and analytical tools that have been applied successfully in many previous FP projects. These tools range from biophysical models (Sitch *et al.*, 2003; Bondeau *et al.*, 2007), to quantitative analysis methods of functional biodiversity (Lavorel et al., 2011), models of land use change (Verburg et al., 2009), and methods to assess economic and cultural evaluation (Fisher *et al.*, 2008; Bullock & Collier, 2011). OPERAs brings together the chief developers of these tools who will focus on further refining and applying them specifically to provide new knowledge in support of the ES/NC concepts.

It is anticipated that ES science will evolve during the life time of the project and advances outside the consortium need to be accounted for. Concurrently, the meta-analysis of practice and the development of instruments will identify new knowledge gaps and requirements for specific methods and insights. WP3 Knowledge will address these emergent requests through an iterative approach in which new insights are communicated to instrument development and testing in exemplars while emergent knowledge gaps are addressed by re-focussing the work plan using the broad expertise available within the project. The process of re-focussing will be implemented through several cross-project workshops and a mid-term advisory council meeting that will help to streamline the process.

Different types of outputs are expected from WP3 Knowledge. These include i) direct outputs aimed at the scientific community through publications in peer-reviewed open-access journals and conference presentations; ii) targeted knowledge exchange with WP4 Instruments (below) where new insights and methods will be used to support information elicitation and the development of instruments while the operational potential will be tested in the demonstration cases in WP2 Practice; iii) specific outputs from WP3 Knowledge will be added to the CP in making the knowledge available to the wider community of scientists and practitioners. Information transferred to the CP includes novel metrics and methods for quantification and valuation of ES, decision trees for selecting appropriate quantification, valuation and trade off analysis methods given scale and context as well as examples of the application and empirical evidence achieved within the exemplars.

WP4 Instruments: Ecosystem Service Instruments and Information Elicitation

WP4 Instruments will explore, expand and exploit the operational potential of the ES/NC concepts by integrating them into public and private decision making and practice through improved information systems, decision-support tools and decision procedures, management instruments (such as PES) and those that assist the development of novel products based on ES. A particular

concern is to integrate the concepts into widely-used information and assessment systems that support routine decision making in areas of policy making, spatial planning, and project development. WP4 Instruments will examine and improve dedicated in-house information tools, which may or may not currently incorporate ES/NC (in-house tools: demand-side), as well as tailor-made tools that are customized for specific users/groups or generalized for a range of potential users (off-the-shelf tools: supply side). The concepts and tools will need to be integrated into implementation schemes that provide information, incentives and mechanisms for market-mediated action that help deliver policy-goals, meet relevant policy criteria and offer scope for developing innovative new products and services. Implementation design and assessment tools will also be needed to guide instrument choices and to help pre-empt and overcome implementation obstacles and reduce implementation risk.

A demand analysis will guide the choice of concept-mainstreaming instruments to be improved in WP4 Instruments. However, strategic choices have already been made to prioritise some instruments, including: enhancing the coherence of ES/NC related indicators sets; broadening and further developing existing Life-cycle Assessment, Environmental Impact Assessment, Strategic Environmental Assessment and Social Impact Assessment; testing participatory decision support tools and increasing their utility to stakeholders, and; exploring the merits and caveats of evaluation and valuation tools in spatial and non-spatial multi-criteria decision analysis, accounting schemes, trade-off analysis, cost-benefit analysis, and scenario and uncertainty analysis as well as in novel, innovative combinations of these. Equally, a set of priority implementation schemes is highlighted by the interest shown in them by key government, business, and civil society actors, including: PES schemes, Offsets, Permitting Processes, and a range of Green Business and Green Finance Initiatives.

While WP3 Knowldege identifies methods to assess, quantify, and value ES/NC, WP4 Instruments addresses the operational and technical challenges in integrating the concepts into different instruments and in mainstreaming new and improved instruments. Examples of key operational questions include: What improvements in instruments would most improve their utility to users and the sustainability of decisions and actions arising from their use? How is the balance to be struck between integrating a full range of ES/NC values and the extra costs of handling more difficult-to-integrate information? How might uptake of improved and new instruments and implementation schemes be motivated and driven? Under what conditions will uptake of the concepts deliver on policy goals cost-effectively and in respect to which goals? Examples of technical questions in both the public and private sectors? How might awareness of critical NC be factored into decisions? What approaches to addressing time preferences and discounting are appropriate when handling ES/NC integration? How might differences in valuations by different social groups be handled, especially in situations of asymmetries of group power, size and vulnerability? Operationally, WP4 Instruments addresses these kinds of questions by:

- i. scoping the *demand* for ES/NC concept uptake in different contexts using top-down, bottom-up and fore-sighting methods and support uptake by establishing actual and potential user needs for improved and new instruments and implementations;
- ii. developing improved instruments, novel applications, and enhanced schemes for implementation and uptake;
- iii. assessing the cost structure, cost-effectiveness and policy added-value of taking up the ES/NC concepts and how these vary across system/scheme designs and application contexts; and
- iv. developing transferable generic and context-sensitive guidance, transferable instruments, technical capacities and experience to support concept mainstreaming, up-scaling, and

extension whenever this adds value cost-effectively and contributes to sustainable market and policy outcomes.

Task 4.1 (the demand for instruments) will establish the needs, expectations and experiences to date on the take-up of ES/NC concepts for a wide range of end users and stakeholders in terms of opportunities and risks, as well as instruments, tools, and implementation options currently in use. An important aspect is to understand the time, budget, data, and institutionally-imposed constraints under which users and stakeholders operate. Of equal importance is to understand stakeholder perceptions of the 'reframing' and constituency-building potential of the concepts, for example in changing discourses and rationales for action, and also their comunication and teaching power. Analysis in Task 4.1 is structured around: broad user and stakeholder engagement; broad definition of 'instruments' and their uses; a wide audit of policies, strategies and commitments where integration could be pursued or which could benefit from integration; coverage of different policy domains, different levels of governance, public and private sector; coverage of different types of ecosystem, NC and ES; and coverage of experience to date. Analysis is top-down, bottom-up and (to anticipate emerging needs and issues) forward looking. Task 4.1 will shortlist priority instruments for development and make preliminary assessments of both the technical potential for ES/NC integration within them and the value-adding potential of ES/NC integration. Stakeholder/user workshops will serve a dual role as an opportunity to obtain insight into what defines implementation 'success' for stakeholders, which is important in establishing criteria for designing and appraising market implementations.

Task 4.2 (information tools and data), Task 4.3 (decision support tools) and Task 4.4 (implementation and management instruments) are organised to reflect the set of (mostly sequential) tasks along the information chain that leads from raw data to action (Figure 2). Data and

knowledge must be collated, represented and integrated to produce useful information. In turn information of disparate types must be presented in understandable form and synthesised to support decisions. Implementation and up-take schemes may be designed to implement policy decisions and/or to incentivise establish and marketmediated mechanisms to deliver action. Different kinds and combinations of instruments and methods are needed to accomplish these tasks, tailored to specific applications and contexts. Since scientists specialise in individual instruments or genres of instruments associated with specific roles and tasks,

is organised around instrument-specific data to action Tasks. Each of the WP4 Instruments



development work in WP4 Instruments Figure 2 Instruments in the information chain: from

Tasks will address priority needs identified through the demand for ES/NC instrument. However, development work takes place in the context of support to actual applications and real-world experiments (partly linked to the Exemplars), which typically span across the chain of tasks and involve the use of several instruments. On this basis, actual applications may be developed both within single Tasks, but also collaboratively and transversally by combining improved and new

instruments across Tasks, and making these tools – streamlined towards ES/NC – communicate with one another.

Interaction across WP4 Instruments and with the Exemplars can be illustrated with the example of ES integration into supply chain management. This offers considerable potential for improvement in social, environmental and business performance, through cost reduction and resource efficiency, as well as corporate social responsibility (CSR) options. Life Cycle Assessment is a widely applied tool in supply chain management. Incentives for a widespread uptake of LCA also include the creation of eco-labels and Environmental Product Declarations (EPD) for use in business-toconsumers and business-to-business communication. OPERAs will explore the use and applicability of LCA in the development of criteria for eco-labelling and EPD using the case of the food and beverage sector, with a focus on wine products - one of the exemplars in WP2 Practice (e.g. development of an ES declaration for a beverage). The need for clear communication tools is highly debated among consumers, as the information requirements could be variable among regions, sectors, levels of society. The specific consumer needs for information will be explored through stakeholder interviews on the local market to assess the demand and to determine the improvement possibilities within the current methods. The results of the stakeholder consultation will be used for further elaboration of the existing tools and possible development of new LCAbased approaches. The process of criteria development will be performed at the interface of the WP4 Tasks with the involvement of end-users. Testing will be performed with selected key groups on the local markets in one of the Exemplars, in order to ground-test improvement possibilities and end-user constraints. The iterative nature of the test process will contribute to further the tool usefulness and applicability in various contexts. Some of these will be assessed by exploring implementation issues for LCA-based instruments in a wide set of green business and green finance initiatives.

Task 4.5 (guidance on choice and application of instruments) will coordinate the work and information flow across WP4 Instruments and produce an overall synthesis of the operational potential of ES/NC instruments, a road map for their application and practice guidance for choice and use of ES/NC instruments, as input to the CP The outcomes will be synthesised in Task 4.5 to provide guidance which will be made available to the CP (WP5) for both business and consumers use.

WP5 Common Platform (CP (Oppla))

WP5 common platform ((CP) Oppla) developed in conjunction with the OPENness project will focus on constituency building, developing an operational ES/NC toolkit, and ensuring perennity of the project. This will be achieved through professional stakeholder engagement, developing a webbased CP using state-of-the-art communication methods, and capacity building activities that increase the technical and human capital of ES/NC practice. Development of an ES/NC CP is central to WP5 Resource Hub, which will form a virtual meeting ground for a network of ES/NC tool users, providers, and researchers, with the goal of promoting ES/NC tools and instruments in a wide range of contexts. Together they will form the OPERAS Community of Excellence (CoE). The CP will be an online platform to assist a broad range of users to find, share, and contribute knowledge, information and resources for innovative, interdisciplinary, ecosystem-based management. It will be the centre of the CoE, and will be set up so that the CoE achieves a shared identity and feels ownership of the CP.

The CP and CoE will be developed through the OPERAs project, and OPENness in close collaboration with WP2 Practice, WP3 Knowledge and WP4 Instruments. Thus, OPERAs and OPENness will engage with a wide spectrum of stakeholders with a view to facilitating their own exploration of the ES/NC concepts leading to the potential emergence of constituencies and

coalitions of advocacy around the concepts and particular implementation logics. We envisage the possibility of there being many implementation logics some or all of which would have potential to improve ecosystem management practices and outcomes. OPERAs and OPENness will characterise these, highlighting synergies among approaches and revealing trade-offs so that these are transparent to decision makers.

Task 5.1 (CP development) will encompass the full process of constructing the CP and tailoring it to user requirements. Tools will provide methods and software/web tools to improve decision-making, along with guidance on the use of the tools. Exemplars will provide examples of ES/NC projects, including, but not limited to, the OPERAs exemplars in WP2 Practice, representing a wide range of geographic locations, ecosystems, planning processes, tools and outcomes. The CP will provide access to publications, toolkits, databases and other resources to promote interdisciplinary ecosystem-based management, including relevant material developed in OPERAs. Knowledge brokerage and networking functionality will bring together companies and organizations and practitioners, providing tools and resources to promote interdisciplinary ES/NC collaboration. The principal components of the OPERAs CP are:

- <u>Technical Assistance and Guidance:</u> step-by-step guidance on designing and implementing ES/NC approaches, providing generic principles and general lessons alongside context-sensitive insights.
- <u>Tools and data:</u> access to tools and data developed within OPERAS, and hyperlinks to additional resources.
- <u>Practitioner training</u>: a training programme will connect practitioners with the knowledge of tool developers and tool application experts. The training program will include on-line and in-person events to inform practitioners about relevant tools; customized training material on tools; choice guidance material for selecting appropriate tools; and a webinar series highlighting key tools and exemplars.
- <u>Young researcher training</u>: curriculum and lectures form the OPERAs summer school will be integrated into the CP, along with social networking functionality aimed at early career researchers, and a forum for work experience placements and job opportunities.

Task 5.2 (stakeholder engagement and facilitation) is central to the whole project. A stakeholder analysis and engagement plan produced at the start of the project will guide stakeholder activities across the project, including in the Exemplars (WP2 Practice) and outreach activities (WP6 Outreach). In addition, a User Board will be set up, which will function as a platform for researchers and stakeholders to create joint ownership over the direction and outcomes of OPERAS. User Board members are in effect shareholders of OPERAS. As shareholders they do not have direct, executive responsibility, but play a prominent role in guiding and steering the project. The mandate of the User Board is to critically engage and orientate the research towards viable and practical outputs for the user community. The User Board meets four times and attracts people with broad experience in ES/NC from OPERAS user communities. This innovative mechanism represents a new level of stakeholder engagement and involvement in large-scale research projects. The User Board adds considerable value to OPERAS by redefining key stakeholders as shareholders.

The research teams in OPERAS will engage with a broad range of stakeholders who have different and varied interests across a number of ES/NC issues. To ensure a consistent level in the quality of stakeholder engagement, OPERAS will operationalize a stakeholder Monitoring & Corrective Action (MCA) system. The purpose of the MCA system is to provide the research teams and stakeholders with a tool for monitoring their engagement and interactions. The MCA system generates data and reports that provide the project with an overview of stakeholder engagement. Through the MCA system, we will be able to monitor stakeholder engagement, respond to any problems and guide the research teams in undertaking corrective actions where necessary. The MCA system enhances the ability of the research team to deliver professional and quality processes of stakeholder engagement across all of the exemplars.

WP6 Outreach: constituency building, outreach and dissemination

WP6 Outreach will promote OPERAs, establish the CoE around the CP, and ensure appropriate project dissemination. To achieve impact we will use professional expertise and state-of-the-art technology and methods, including facilitated workshops, promotional events, short films, social media, blogs, webinars, crowd sourcing, blogs, and journalist field trips. OPERAs will maximize impacts in science, policy and practice by developing targeted dissemination strategies for specific groups,. A major activity will comprise outreach activities aimed at building the CoE. These include tailored promotional material, short promotional events for business leaders and senior policy makers, and developing a series of training workshops and webinars for professionals. A final conference, at the end of the project, is aimed at the CoE and will provide a peer-to-peer learning opportunity based on the full richness of OPERAs outputs. Similarly, a post-graduate summer school will ensure that the next generation of researchers will learn from the OPERAs research and experience.

Integration and relationships between the WPs

THE OPERAs project has been designed around a series of interrelated work packages that are used

to organize specific research activities (see Figure 3). Each work package will coordinate, integrate and synthesize the module outcomes for implementation in the Resource Hub and the CoE. Best practice examples, data, knowledge and instruments are used throughout the lifetime of the project by WP6 Outreach in creating the WP5 Resource Hub and the CoE that will extent beyond the project consortium. The Resource Hub will provide the main interface between the OPERAS research outputs and the CoE for continued practice and together these will ensure perennity of the OPERAS findings beyond the project lifetime. WP6 Outreach also contains the project dissemination activities and the coordination of the stakeholder engagement process. Professional stakeholder engagement and facilitation throughout will establish the CoE around OPERAs activities, and optimise the saliency and relevance of the research to the broader community of policy makers, key



Figure 3 The OPERAS WPs aim to maximise operationalization of ES/NC by establishing a Community of Excellence around the Resource Hub.

stakeholders and the wider public. WP2 Practice is central to the project structure since the project activities are based on experience from practice and new insights and approaches are tested in practice. WP2 Practice closely links to the other OPERAs modules. Results from the Meta-Analysis will be used to identify knowledge gaps and the demand for instruments and deliver important input for WP3 Knowledge and WP4 Instruments. WP3 Knowledge focuses on addressing knowledge gaps that hinder the operationalisation of ES/NC concepts and will provide the necessary insights, data and methods to support the enhancement of existing instruments and the development of innovative, new instruments and products. Results from WP3 Practice will feed into the identification of instrument needs and into an assessment of knowledge gaps on ES/NC modelling, valuation and trade-off analysis. The manifold activities within the Exemplars (WP2) bring into practice the advances made in WP3 Knowledge and will serve as test bed for the tools developed in WP4 Instruments. Lead partners responsible for instrument development will participate in scoping the demand for instruments. The exemplars will employ a joint learning approach in testing and demonstrating the potential of the ES/NC approach by teams of scientists and practitioners in close collaboration with relevant stakeholders. Subsequent iterations will enhance the scientific knowledge and refine the instruments to adapt to the experiences in practice. As new results from the Exemplars (WP2) become available for synthesis, updated lessons learned will be generated and communicated, the main linkage being with the WP5 Resource Hub and WP6 Outreach. This will include guidance for the selection of appropriate tools and instruments for different situations in the form of decision-trees. WP1 serves the project by organizing the management activities.

Figure 4 provides an overview of the relationships between the project WPs and Tasks. The arrows in Figure 4 reflect relationships and flows of data and knowledge encapsulated in the project deliverables. These are explained below the figure.



Figure 4 Pert diagram showing the OPERAS WP structure and the interconnections between WPs and Tasks.

Explanation of arrow labels explaining relationships and flows of information:

- a) The outcomes of the meta-analysis of past ES/NC studies (D2.2) will highlight gaps in current understanding of ecosystem processes and functioning, ES/NC valuation and governance structures and their contributions to ES/NC management. This insight will guide the WP3 research in developing research that tackles these gaps;
- b) The outcomes of the meta-analysis of past ES/NC studies (D2.3) will highlight current limitations in instruments that operational the ES/NC concepts. This insight will guide the WP4 research in enhancing existing and developing new instruments (D4.3, D4.4, D4.6;
- c) The outcomes of WP3 will provide new insights into ES function and quantification (D3.1), ES/NC valuation methods (D3.2, D3.5) and governance structures (D3.3, 3.6) and their synthesis (D3.7) that will underpin the research within the exemplar studies.
- d) The outcomes of WP4 will provide insight into a range of existing and new instruments (D4.3, D4.4, D4.5, D4.6, D4.7) that will be tested in the exemplar studies (D2.3, D2.4)
- e) The WP3 research on ecosystem function and quantification (D3.1), ES/NC valuation (D3.2, D3.5) and governance structures (D3.3, D3.6) will be synthesized within Task 3.6 (D3.7)
- f) The WP4 research on demands for ES/NC instruments (D4.1, D4.2), information tools and decision support tools (D4.4, D4.6) and their implementation (D4.5) will be synthesized within Task 4.5 (D4.7)
- g) WP2 will provide the CP (D5.1, D5.4, D5.5) with the outcomes of the meta-analysis of existing ES/NC studies (D2.2), worked examples of ES/NC instruments applied in practice within the Exemplars (D2.1, D2.3) and a synthesis (D2.4) of the lessons learned from the Exemplars contributing to best practice and instrument implementation (D4.5)
- h) There will be a two-way flow of knowledge and insight between WP3 and WP4. WP3 will provide the scientific evidence and quantification of ecosystem functioning (D3.1), ES/NC valuation (D3.2, D3.4) and governance structures (D3.3, D3.6) to support the development of new ES/NC instruments (D4.4, D4.6). WP4 will provide the ES/NC instrument context that will guide the WP3 research especially in terms of linking potential policy instruments (D4.1, D4.2) to appropriate governance structures (D3.3, D3.6) and ES/NC valuation methods (D3.2, D3.4).
- i) The WP3 synthesis (D3.7) will provide inputs to the CP (D5.1, D5.4, D5.5) on the trade-offs and synergies in ES/NC knowledge
- j) The WP4 synthesis (D4.7) will provide guidance to the CP (D5.1, D5.4, D5.5) on the choice and application of instruments, including best practice (D4.5)

Risks to the successful implementation of the research

The complexity of the project implies that risks cannot be excluded. For example, the input from WP3 Knowledge is essential to all other work domains in the OPERAs project, and failure of delivery of results will directly affect innovation that may be achieved in WP4 Instruments and the operationalization in WP2 Practice. The project concept is ambitious, but it is well-rooted in scientific theory and takes stock of the recommendations made in recent research related to the operationalization of ecosystem services. The required level of integration is reflected in the diversity of participating teams (Universities, Research institutes, SMEs, NGOs). The commitment and motivation during the development of the project suggests that the integration challenge can be met, but risks remain, not least because of unexpected scientific or policy developments. The project has been designed to ensure that risks are identified early through continuous assessment of progress, and regular meetings of the Project Management Team (PMT; see later). Specific risks that will be monitored include:

- <u>Stakeholder engagement risks:</u> OPERAs critically depends on the active involvement of various stakeholder groups throughout the project implementation. A comprehensive stakeholder engagement plan will be developed along with a stakeholder Monitoring & Corrective Action system, which will provide the research teams and stakeholders with a tool for monitoring engagement and interactions.
- <u>Timing risks and operational risks</u>: Delays, which can be caused by staffing difficulties or lacking competencies, can affect other deliverables and will often impact other tasks, deliverables or milestones. Early corrective action can prevent subsequent problems.
- <u>Budget risks</u>: Contingency plans to overcome delays can have budget consequences, which will need to be assessed, and a solution agreed by all concerned partners.

Work Package	Task	Subtask	Reporting period	1 (months)	RP2 (month	s)			RP3 (months)				RP4 (r	nonths)
			1 2 3 4 5 6 7	8 9 10 11 12 13 14 15 16 1	7 18 19 20 21 22 23	24 25 26 27 2	8 29 30 31 32	33 34 35 36	37 38 39 40 41 46	2 43 44 45 46	47 48 49	50 51 52 53	54 55 56 57	7 58 59 60
WP1 Management	1.1 Project implementation	Compiling documents Advintain workplan												
		3. Project reporting												
		4. External contacts	-											
WP2 Practice	2.1 Meta-analysis	1. Database set-up												
		2. Assessment of methods												
		3. Efficiency indicators												
		4. Meta-analysis existing cases												
		5. Identifyingknowledge gaps												
	2.1 Exemplars	1. Start-up and design												
		2. Process evaluation												
		3. Iterative learning												
	2.3 Design and synthesis	4. Proces evaluation												
	2.5 Design and synatesis	2. Synthesis of Jessons Jearned												
		3. Decision-tree design												
WP3 Knowledge	3.1 ES/NC Quantification	1. Link ecosystem function and services												
		2. Embedding processes												
		3. Spatial and temporal dimensions												
		4. Uncertainty assessment												
	3.2 Social and cultural values	1. Social valuation												
		2. Assessment of spatial distribution			-									
		3. Alternative valuation methods										_		
	5.5 Market and non-market valuation	2 Moto applyis aconomic valuation methods												
		 Weta-analys economic values Integration in accounting frameworks 												
		4. Translation values into PES	·											
	3.4 Governance systems	1. Constructing governace typology												
		2. Analysing role of property rights												
		3. Analysis of policy integration												
		4. Analysis of juristiction issues												
	3.5 Trade-offs and synergies	1. Guiding communication												
		2. Operationalise trade-offs methods												
		3. Develop novel assessment methods										_		
MDA In strong on to	4.1 Demende fer instrumente	4. Trade-offs across patterns												
WP4 Instruments	4.1 Demands for instruments	2 Bottum-un identification of needs	-											
		3. Identification of emerging issues												
		4. Policy needs												
	4.2 Information tools	1. Development of new data tools												
		2. Improving indicator based tools												
		3. Improving accounting tools				_								
		 Imporoving visualisation tools 												
	4.3 Decision support tools	1. Multicriteria decision analysis	-											
		2. Cost-Benefit Analyses	-											
		Second and foresight	-											
		5 Innovative user interfaces												
	4.4 Implementation and uptake	1. Developing success criteria												
		2. Developing evaluation protocols												
		3. Market based implementation logics					1 1 1							
		4. Spatial planning implementation												
		5. Finance implementation												
	4.5 Instrument choice guidance	1. Instruments coordiination												
		2. Synthesis of operational potential												
	510	3. Reccomendations and guidelines												
WP5 Resource Hub	5.1 Resource Hub developement	Identification of user needs Decourse Hub decime											_	
		3 Resource Hub development												
		4. Perrenity of the Resource Hub												
	5.2 Stakeholder engagement	1. Stakeholder engagement plan												
		2. User Board												
		3. Workshop facilitation												
		4. Stakeholder engagement monitoring												
WP6 Outreach	6.1 Outreach and dissemination	1. Project dissemination												
		2. Outreach and constituency building												
		3. Summer school organisation												
		4. Conference organisation												

B1.3.2 Timing of the work packages and their components

Figure 5, Gantt chart illustrating timing of work packages and tasks

B2. IMPLEMENTATION

B 2.1 Management structure and procedures

The OPERAs project has high ambitions for the integration of different disciplinary expertise and perspectives as well as in the integration of science and practice. The management structure is designed specifically to achieve these objectives by being kept as simple as possible to guarantee transparent decision making and short lines of communication allowing rapid responses to developments in the field and iterative adaptation to experiences from project applications in practice. The details of the project management will be defined and agreed within a Consortium Agreement (following DESCA). Figure 6 summarises the overall management structure. OPERAs groups several Tasks into WPs. Each WP has two co-leaders, who play an important role in project management. This structure establishes a relatively small management team that is capable of safeguarding the flow of information between the WPs, which is core to being able to achieve the envisioned project results.

The Project Management Team (PMT)

The PMT is the main management and decision-making body of the project, which is chaired by the Project Coordinator with assistance from the Deputy Coordinator and comprises the WP co-leads, (9 persons in total). The PMT is responsible for decisions about project strategy (if required, in consultation with the Commission), progress, staff exchanges, political connections and collaboration with other projects or programmes (see 2.1.4 and 2.1.8 for more details). The PMT will meet 20 times over the 5 year project life (Table 1.3e), of which at least six will be physical meetings. Additional meetings of the PMT will be convened using Internet conferencing facilities as issues arise that require action and coordination. The PMT prepares the documents and agenda for the Consortium Assembly.

The Consortium Assembly (CA)

The CA is a gathering of representatives of all 25 partners. The Assembly meets once a year to discuss progress and to advise on project strategy and other outstanding issues. By consent, the CA is the final decision body of the project in matters of major strategy revision and in the eventuality that partners are declared redundant.

The Daily Management Team (DMT)

The DMT is responsible for monitoring and coordinating the project on a daily basis, preparing progress reports, and for dealing with legal, financial and secretarial matters. It implements management tasks delegated by the PMT. The Project Coordinator leads the DMT, supported by experienced support staff in the areas of project administration, legal and financial issues, and public relations and communication. The DMT is also responsible for the organisation of project meetings, and meetings with the Advisory Council, including conference calls to resolve problems, if so required. Activities of the Project Coordinator are further detailed below.

The WP leaders and Task leaders.

The WP leaders are responsible for developing detailed WP and Task implementation plans on the basis of the DoW, and for the efficient and effective implementation of these plans, taking into account the timeliness and quality of the deliverables, and the efficiency of the relationships between the participating partners. Each WP is led by two co-leaders who were selected for their experience and overview of the different topics addressed in the WP, and their interdisciplinary

skills and experience in translating science into practice. WP leaders represent different partner institutions and disciplines to provide complementary views.

More specifically, the **WP Leaders** are responsible for:

- Design of WP work plans;
- Communication within the WPs, including organisation of project meetings;
- Proper interrelationships and information flows between the Tasks;
- Organization of the information flow between WPs;
- Overall progress and quality assurance within the WP;
- Communication with the participants on items discussed in and decisions of the PMT

Moreover, the Task Leaders are responsible for:

- Informing the WP Leaders and the Project Coordinator on a bi-monthly basis, or more frequently if required, about the progress made to allow the WP Leaders and the Coordinator to monitor the project and implement corrective actions if needed;
- Subtask assignment for individual subtasks within Tasks;
- Progress monitoring of milestones and expected outcomes of the Task;
- Delivering input to the WP Leaders and Coordinator for the preparation of periodic reports;
- Organisation of workshops (if included in the Task);
- Organisation of project meetings if necessary to ensure proper execution of Tasks;
- Stimulation of interaction and proactive sharing of information with other Tasks and WPs.

Project coordination

The overall co-ordination, including financial co-ordination, administrative and day-to-day issues and the official contact with the European Commission will be the responsibility of UEDIN. The University of Edinburgh is one of the largest and most successful universities in the UK with an international reputation as a centre of academic excellence. Its international character is reflected in its student population, which comprises of 2,000 European students and 3,442 International students (out of a total population of around 24,500 students) from over 120 different countries worldwide. It can also be found in its truly international staff and in its joint research and other links with overseas universities, institutes, companies and governments.

The University is the leading research university in Scotland and is amongst the top ten in the United Kingdom. On a European level, traditionally the University has been very successful in participating in European Framework Programmes. In the Fifth Framework Programme (1999-2002) the university collaborated in over 200 projects, amounting to a total award value of £25M (€40M). This success continued into the Sixth Framework Programme (2002-2006) and the

university participated in 180 projects (25 as project co-ordinator) with an award value of £50M (€74M), currently in the Seventh Framework Programme (2006-2013) the university participates in 176 projects (17 as project co-ordinator) with an award value of £89M (€116M). With this experience, the University is well positioned to act as Co-ordinator for the project.



Figure 6. OPERAs management structure

The Scientific Coordinator Prof. Mark Rounsevell of The University of Edinburgh will be responsible for the overall project management. The Deputy Coordinator Dr. Marc Metzger, who can replace him if necessary, assists him. They have worked as a team on a range of complex international EU projects. The Coordinator and the Deputy Coordinator will always decide matters of research content in consultation with the PMT, where the final decision rests with the Coordinator. A Daily Management Team of highly experienced personnel for financial control, addressing legal issues and administration will support the project coordination.

Prof. Mark Rounsevell is an experienced, multi-disciplinary scientist who has been involved in successful EU projects in the field of ecosystems and land use. He has considerable experience in project management by leading two EU FP5 projects (ACCELERATES and IMPEL), co-leading the FP7 project VOLANTE, and leading work packages in more than ten further EU projects. The deputy project leader is Dr. Marc Metzger. He complements the expertise of the project leader through experience in stakeholder engagement, critical for the successful management of this project. His project management skills have been developed through Work package leadership of the FP7 project EBONE and Module leadership in the FP7 project VOLANTE. The Coordinator is responsible for the following activities.

Internal and organisational management and support

- Organisation of project meetings (CA, DMT and PMT);
- Preparation of the agenda and minutes of the PMT meetings;
- Design of project work plan;
- Ensuring communication between DMT, PMT and CA; send regular reminders;

- Monitoring of overall progress and output with respect to milestones and expected quality of output and deliverables;
- Preparation and submission of the periodic reports and deliverables;
- Enhancement of optimal interaction between work packages, communication between partners;
- Maintaining an internal project website and ensuring quality and relevance of the contents to allow for transparent information sharing and flexible links between the WPs.

Administrative and Financial Management

- Submission of the periodic reports to be submitted to the Commission (scientific, financial);
- Preparation and submission of the financial reports, structured gathering of financial information from the participants (each partner is responsible of own audit certificate);
- Execution of administrative and financial obligations, including interface with the Commission and budget allocation for each partner, organising financial accounting;
- General management activities and secretariat activities;
- Legal aspects (consortium agreement).

External Communication

- Liaison with the Commission and WP leaders; in accordance with EU regulations, the Project Coordinator will submit to the Commission the appropriate management and financial reports for the previous 18-month period, as well as the necessary detailed implementation and financial plans for the forthcoming 18-month period;
- Communication to external parties and other EC-funded projects;
- Regular communication with other EU projects will be used to enhance mutual benefits and complementarity of the work, notably with BE-SAFE, VOLANTE, CLIMSAVE and the sister project and GEOBON project under the current call (see 3.1.2);
- External presentations of the project.

Advisory Council

An Advisory Council (AC) will be established to advise the PMT, to safeguard the strategic impact of the project results, and to act as the advisory committee for the OPERAS conference and summer school (WP6). The AC comprises renowned international experts and high level European stakeholders in the ecosystem services domain representing all major stakeholder groups: Policy, NGO's, Business, and the relevant Scientific Communities. The AC is managed by the Project Coordinator and will meet three times during the project lifetime, in combination with plenary project meetings or relevant workshops. A significant meeting with the AC will be scheduled midway through the project, when general progress will be evaluated. The AC will provide advice, guidance and feedback that will allow OPERAs to reflect on and adjust its work plan and to ensure greatest impact. At present, the AC consists of 6 members who have confirmed participation (see Table 2.1a). In total we aim for an AC consisting of no more than 10 key members to provide a balance between diversity of expertise and practical considerations. If two projects are funded under this call, the coordinators of the second project will be invited onto the AC to help ensure the complementarity and cooperation between projects. The representation of AC members from different world regions allows for stronger embedding of the project within the global research community in this field. In parallel to the AC a User Board will be established as a platform for researchers and stakeholders to create joint ownership over the direction and outcomes of OPERAS. The role of the User Board is to critically engage and orientate the research towards viable and practical outputs for the user community and will not have a role in formal project management. The User Board is described in more detail in section 1.3.1.

The operational management of OPERAs will be jointly realised by the Coordinator and the Project Management Team (PMT), while the Daily Management Team (DMT) deals with administrative and financial issue. The PMT will be in charge of the overall direction of OPERAS, in close consultation with the Consortium Assembly (CA) as the consortium's central decision-making body. The PMT comprises the WP Leaders, the Coordinator and the Deputy Coordinator. Each project partner in the PMT has one vote. Other project partners, members of the Advisory Council, and other qualified persons may be invited to attend meetings of the PMT as an advisor/observer without vote. The Coordinator or the Deputy Coordinator chairs the PMT, which will meet at least 20 times during the five year project to review overall project progress, and enhance project implementation. The Coordinator sets the agenda for meetings and secures the implementation of decisions taken by the PMT in the DMT. The PMT will oversee all activities related to publishing and exploiting project results and will also advise the CA about consortium budget shifts and financial allocations and may advise by unanimous vote minus the concerned partner about an exclusion of a partner in case of severe malpractice.

Decisions by the PMT will normally be taken by consensus, but where this is not feasible the principle of majority voting will apply. Where a matter cannot be resolved by majority voting, the coordinator will have the casting vote. Decisions on issues related to daily progress of the project will be taken by the DMT as delegated by the PMT. All partners will be informed about decisions pertinent to their work in the project through e-mail or telephone and intranet. Task leaders are responsible to timely report problems to their WP leader and the Coordinator if they cannot easily be resolved.

Quality assurance

The Coordinator will design a Research Implementation Plan at the start of the project, which will contain indicators for quality assurance related to the deliverables and control of milestones, as well as the impact indicators. Such quality indicators may include internal or external review or endorsement of activities such as workshops by the relevant agencies or international organizations. A quality assurance statement will be a crucial element of the Consortium Agreement.

High standards of project deliverables are further ensured through an internal review process organised by the WP leaders. All deliverable reports will be reviewed by two internal or external referees, and, if needed, improved prior to submission to the Commission. The PMT will identify important deliverable reports with high external impact, for which at least one project external review will be requested. It is furthermore project policy, that all relevant scientific results should be published in peer-reviewed scientific journals, as much as possible under open-access policies.

The verification of milestones is another important element in quality assurance. As indicated in Table 1.3d, the PMT and the AC have a role in this verification.

Quality assurance is also closely related to adequate action in case of unforeseen developments, such as failure of performance or missing data. Section 2.1.8 describes the Risk Contingency Plan to cope with such problems.

Table 2.1a Members of the project Advisory Council

				Participation				
No.	Name	Organization	Country	commineu.	Expertise			
1	Ms Anne Larigauderie	DIVERSITAS	France	Confirmed	Executive director Diversitas, the international research programme aiming at integrating biodiversity science for human well-being			
2	Paul Suttor	University of Colorado	USA	Confirmed	Leading scientist in ecosystem service science			
3	Ronan Uhel	European Environment Agency	EU	Confirmed	Head of the EEA Natural Systems and Vulnerability Programme			
4	Prof. Gretchen Daily	Stanford University	USA	Confirmed	Leading scientist in ecosystem service science			
5	Rob Jongman	Alterra	Netherlan ds	Confirmed	European co-lead of GEO BON			
6	James Griffiths	World Business Council for Sustainable Development	Switzerla nd	To be confirmed	Chair of the Ecosystem Focus Area			
7	Prof. Anatha Duraiappah	IHDP	Germany	To be confirmed	Executive director IHDP			
8	Ms Dominic Richard	European Topic Centre on Biological Diversity	France	To be confirmed	Director, focusing on state of biodiversity reporting, and development of biodiversity indicators			
9	Prof. Yu-Pin Lin	National Taiwan University	Taiwan	To be confirmed	Head of Bioenvironmental Systems Engineering, ES modeling expert			
10	Prof. Stephen Polaski	Univeristy of Minnesota	USA	To be confirmed	ES/NC valuation, biodiversity conservation			
11	Prof Eeva Furman	Syke, Helsinki	Finland	Confirmed				
12	Representative DG Envi	ronment	Belgium	To be confirmed				

Consortium Agreement

A Consortium Agreement will be drawn up, approved and signed by all consortium members and come into force at the start of the project. The Consortium Agreement will be based on the DESCA format. The function of the Consortium Agreement is to specify the organisation of the work between the partners and the decision-making procedures, to organise the management of the project, to establish quality assurance rules, to define rights and obligations of parties, including, but not limited to, their liability and indemnification, and to supplement the provision of the EU contract concerning access rights and to set out rights and obligations of the parties supplementing, but not conflicting with those of the EU contract. The Consortium Agreement will also include rules for the potential addition or replacement of consortium partners. The Consortium Agreement will be designed according to the ISO 10006 international management standards.

B 2.2 Beneficiaries

Partner 1: UEDIN – The University of Edinburgh

The University of Edinburgh is one of the largest and most successful universities in the UK, with an international reputation as a centre of academic excellence. In June 2008 the Times Higher rated the university in the world top 8 for Ecology and Environment research. Its international character is reflected in its student population, which comprises 24,500 students from over 120 different countries worldwide. It can also be found in its truly international staff as well as in its joint research with overseas universities, institutes, companies and governments. The main body of work on this project will be carried out within the Research Institute of Geography and the Lived Environment. The institute provides scientific evidence and analyses that support policies for sustainable development in the fields of energy and climate, land and water use as well as international development. It is a hub for policy-related, interdisciplinary research and teaching within the School of Geosciences and the University of Edinburgh. UEDIN will be in charge of the overall project coordination, will co-lead WP2 (Practice), lead WP6 (Outreach) and contribute to the Exemplars and WP5 (Resource hub).

Prof. Mark Rounsevell is Professor of Rural Economy and Sustainability. He specialises in land use change analysis, environmental change scenarios, and climate change impacts, adaptation and vulnerability assessment. He contributed to many EU-funded research projects including IMPEL and ACCELERATES (as coordinator), ATEAM, ALARM, PLUREL, ECOCHANGE, FARO, CLIMSAVE and VOLANTE (as deputy coordinator). He was lead author to the 2nd, 3rd, 4th and currently 5th IPCC Reports.

Dr. Marc J. Metzger is a Senior Research Fellow in Environmental Change Modelling with expertise in scenario development and vulnerability assessment. He has worked in a wide range of EU funded projects focusing on the potential impacts of global change on ecosystems and the services they provide to society including ATEAM, BIOHAB, FARO, COCONUT, EBONE, CLIMSAVE and VOLANTE.

Dr. Meriwether Wilson is a Lecturer in Marine Science and Policy, focusing on the sciencepolicy-society intersections of ecosystem services, biodiversity and sustainable development in transboundary coastal-marine ecosystems. Her research stems from two decades of international experience (World Bank, UNESCO, UNDP, IUCN) in over thirty countries worldwide.

Dr. Genevieve Patenaude lectures in Forest and Carbon management, focusing on mechanisms to finance global forests. She leads a network on forest-finance risks and a nationally funded project on Ecosystem Services for Poverty Alleviation. She works closely with the private sector, advising McKinsey & Co., and supported the founding of two SMEs: Ecometrica Ltd. and Carbomap Ltd.

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Partner 2: VU-IVM - Institute for Environmental Studies, VU University Amsterdam (Stichting VU-VUMC)

The Institute for Environmental Studies is the oldest environmental research institute in the Netherlands (http://www.ivm.vu.nl). VU-IVM has built up considerable experience in dealing with the complexities of environmental problems, participating in numerous (inter)national research projects. The institute has repeatedly been evaluated as the best Dutch research group in this field. VU-IVM's research community of about 150 scientists and support staff addresses challenging environmental problems and offers both pragmatic and innovative solutions. The department for Spatial Analysis and Decision Support (SPACE) has an outstanding record in integrated observation and modelling of socio-ecological systems with a focus on ecosystem services, adaptation to climate change, land change and decision support. SPACE has experience in developing a range of different decision support tools involving policy makers and stakeholders in processing complex information on socio-ecological systems. The department of Environmental Economics (EE) is specialized in (participatory) valuation of ecosystem services and adaptation measures. Also, the department leads several projects in the field of community-based environmental monitoring and natural resource management. IVM-VU will lead WP3 (Knowledge), and the Tasks on market and non-market valuation), trade-offs and synergies between services and alternative perspectives and contribute to the Examplars and WP4

Prof. Dr. Peter Verburg (*Professor Environmental Spatial Analysis*) has strong expertise in spatial analysis and modelling of land use, quantification and mapping of ecosystem services, biodiversity, ex-ante assessment models and decision support. He is chair of the Global Land Project a core project of IHDP and IGBP bringing together research on land change from different (disciplinary) perspectives. He coordinates the BiodivERsA project CONNECT and is module leader in FP7 VOLANTE and CLAIM. He has (co-) authored over 100 scientific papers in the field of land change and environmental assessment.

Prof. Dr. Roy Brouwer (*Professor Economic Valuation of the Environment*) is specialized in ecosystem services valuation and integrated impact assessment. He coordinated the FP6 project AQUAMONEY aimed at developing guidelines for water resources valuation for the Water Framework Directive. He has published in international journals and edited two books, 'Managing wetlands: an ecological-economics approach' and 'Cost-Benefit Analysis and Water Resources Management'. He has led socio-economics work packages in several EU funded projects, including ECOWET, BRIDGE and POLICYMIX.

Prof Dr. Jan Vermaat (*Professor Earth Sciences and Economics*) directs the MSc programme in Earth Sciences and Economics at VU University Amsterdam. Keywords characterizing his research: ecosystem functions vis-à-vis biodiversity, catchment biogeochemistry, water quality, floodplains, coastal ecosystems and the interface between ecology and economics. He is co-editor-in-chief of Aquatic Botany since 2001. Jan has cooperated in a range EC-funded projects including SPICOSA, RISKBASE, KNOWSEAS and RESPONSES. Jan also worked as an aquatic ecologist for EEA, World Bank and GEF.

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Partner 3: KIT – Karlsruhe Institut für Technologie

The Karlsruhe Institute of Technology (KIT) is a higher education and research organisation with about 8000 employees and 18,500 students. KIT was established on 01/10/2009 as merger of Karlsruhe University (founded in 1825) and the Research Centre Karlsruhe (founded in 1956), member of the Helmholtz Association. Within the KIT the Institute for Meteorology and Climate Research, Atmospheric Environmental Research (IMK-IFU) concentrates on major regional and local environmental problems that are in the center of public interest, i.e., among others, atmospheric pollution and climate change. The work program comprises studies of the interactions between biosphere and atmosphere, vegetation dynamics and forest growth patterns, and the associated carbon sequestration, and exchange of environmentally relevant trace substances, including in response to disturbance. Information is used for the development of process-oriented dynamic vegetation models for the simulation of biosphere-atmosphere exchange, biogeochemical cycles and other ecosystem services, for the derivation of efficient mitigation and/or adaptation measures. KIT will co-lead WP3, co-lead Task 3.1, and contribute also to Task 3.5. KIT will also participate in the global Exemplar.

Prof. Almut Arneth, leads the KIT/IMK-IFU department on plant-atmosphere interactions. Her research concentrates on interactions of climate change, land use change and ecosystem services, especially with respect to ecosystem biogeochemical cycles, carbon-water-nutrient and wildfire. Since obtaining her PhD degree in 1998 she has authored and co-authored close to 90 publications in that field, including in Science and Nature Geoscience. She was a FP6 Marie Curie Excellence Team leader (the fore-runners to the ERC Starting Grants), was a founding member of the Steering Committee of the IGBP land-atmosphere project iLEAPS, and is member of the Earth Science Advisory panel of the European Space Agency. She heads a 2.5 Mio € Strong Research Environment grant on "Land use today and tomorrow". She has been and is active as partner and WP leader in many European projects (ATEAM, Eurosiberian Carbonflux, LBA, CarboAfrica, ClimAfrica, FUME), and is module and WP leader in the FP7 IPs PEGASOS (Pan European Gas and Aerosol Study) and ECLAIRE (Effects of Climate Change on Air Pollution Impacts and Response Strategies for European Ecosystems).

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Partner 4: UFZ - Helmholtz-Centre for Environmental Research

Being an international centre of competence, the Helmholtz Centre for Environmental Research (UFZ) investigates the interactions between man and environment in used and disturbed landscapes. It currently employs around 900 staff in total. UFZ research combines fundamental and applied research. The main body of work on this project will be carried out within the Department for Computational Landscape Ecology (CLE). CLE has a strong emphasis on the methodological advancements in modelling and simulation of environmental systems with a thematic focus on ecosystem services, land use and biodiversity. UFZ will contribute to Task 2.1 (Meta-analysis), Task 2.4 (Synthesis), Task 3.1, Task 4.3 (Decision Support Tools and Methods), Task 4.4 (Implementation and Uptake), Task 4.5 (Guidance on Choice and Application of Instruments) and WP5 (Resource hub).

Ralf Seppelt studied applied mathematics at the Technical University Clausthal, Germany, obtained his doctorate degree at the Technical University Braunschweig, Germany in Agroecology and System analysis. After research stays at the Institute for Ecological Economics, Burlington, USA and CSIRO in Canberra, Australia he was appointed to a professor for landscape ecology at Martin-Luther University Halle-Wittenberg and is head of the department for Computational Landscape Ecology. His major research interests are methodological developments in landscape ecology within the field of natural research management and ecosystem services.

Martin Volk, holds a graduate and PhD degree from the Justus-Liebig-University of Giessen, Germany, Faculty of Geosciences. In 2010, he achieved the habilitation from Martin-Luther-University Halle-Wittenberg. His research focuses on scale appropriate analysis, assessment and management of landscape water and matter dynamics (systems research, landscape models, river basin management).

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Partner 5: ULUND - Lund University Centre for Sustainability Studies (LUCSUS)

LUCSUS is a cross-faculty organization for interdisciplinary research on sustainability science, currently employing 30 researchers. Its core is the trans-disciplinary international graduate school in

sustainability science, comprising Master's and PhD programs. Projects cover themes such as the science/policy interface in connection with climate change, integrated water resources management, land use and agricultural policies in the EU and beyond, and sustainability assessment tools and methods. Most of the funding is generated through large collaborative EU projects under FP-6 and FP-7. Its researchers participate in international scientific assessments, such as IPCC and GEO. LUCSUS also coordinates the Linnaeus centre LUCID (2008-2018), aiming at integrating social and natural dimensions of sustainability. We host the international project office of the Earth System Governance (ESG) project under IHDP. ULUND will co-lead Task 2.2; lead Tasks 3.3 and 4.5; and co-lead WP4.

Assistant professor Kimberly Nicholas, is an Assistant Professor of Sustainability Science at the Lund University Centre for Sustainability Studies in Lund, Sweden. Kim's research motivation is to understand what human changes to the Earth's climate and land surface will mean for the future of the ecosystems on which we depend. She uses observational, experimental, modelling and synthesis approaches to study how climate variability and change affect crop development, yields and quality, especially in the wine industry; climate adaptation and food security; land use, biodiversity, and ecosystem services; and the theory, practice, and pedagogy of sustainability science. She holds a PhD in the Interdisciplinary Program in Environment and Resources from Stanford University and an MS in Viticulture (Horticulture and Agronomy) from the University of California, Davis.

Professor Lennart Olsson, Professor in Physical Geography, founding Director (since 2000) of LUCSUS. His research focuses on human-nature interaction in the context of land degradation, climate change and food security in drylands; research tools include GIS, remote sensing, spatial modelling and systems analysis. He has held research positions in Australia, USA and Hong Kong. International assignments include chairman of the external advisory board of the newly established National Socio-Environmental Synthesis Center (Washington DC), membership of several international editorial boards, UN assignments, Coordinating lead author of the IPCC 5th assessment report (WGII, Ch. 13), lead author of IPCC report on Good Practice Guidance for LULUCF (2002-03) and lead author of UNEP's GEO-4 (2006-07).

Professor Paul Weaver is adjunct Professor of Sustainability Science. His research interests include the development of concepts, methods and tools for analysing social-ecological systems. Sectoral interests include transport, energy, waste and recycling. Cross-cutting themes are sustainable production and consumption, lifestyles, spatial planning, space and time use, ecosystem services and governance. Methods and tools include systems analysis, place-based and chain-based analysis, time-space frameworks, sustainability assessment, participatory processes and knowledge brokerage. He has held research positions in the UK, Sweden, Austria and France. He is author of several books, chapters and journal articles on foresighting, backcasting, innovation and transition.

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Partner 6: EFI – European Forest Institute

The European Forest Institute is an international organisation established by European States. The mission of EFI is to strengthen and mobilise European forest research and expertise to address policy-relevant needs. EFI has currently app. 130 associated members (both research organizations and end-users of research) in Europe and beyond. Main research areas are (i) sustainable forests and climate change (ii) policy and governance and (iii) future of the forest sector and society. EFI employs app. 60 person-years of experts and support staff at Headquarters in Joensuu, Finland and in 5 Regional Offices. EFI excels in carrying out projects on relevant forest issues at the European level, and has a track record of over 30 projects carried out for the European Commission DGs during the past few years. EFI has also large expertise in policy advice and maintains the EU FLEGT and EU REDD+ facilities. EFI will co-lead WP4, lead Task 4.5 (Guidance on Choice and Application of Instruments) and contribute expertise on forest-related instruments and multi-criteria decision making methods to Tasks 4.1, 4.2 and 4.3 and WP5. The involvement of the EFI Regional Office staff of EFI/BOKU is handled via a third party agreement (see 2.3.1)

Dr. Marcus Lindner, Head of Programme (Sustainability and Climate Change), has 20 years of experience in research on climate change impacts and adaptation in forest management, forest sector sustainability assessment and bioenergy potentials from European forests. Involved in over 20 European projects, e.g. EFORWOOD, MOTIVE, VOLANTE, GHG-Europe. Coordinated in EFORWOOD the development of the Tool for Sustainability Impact Assessment (ToSIA). Leads in MOTIVE the Dissemination and Stakeholder engagement work package and in VOLANTE the analysis of pathways towards desired land use visions.

Tommi Suominen is Senior Software Developer at the European Forest Institute and has coordinated the design and implementation of the software Tool for Sustainability Impact Assessment (ToSIA), since its beginning in 2006 within the EU-project EFORWOOD, followed up by the NPP project Northern ToSIA. He has also implemented a significant part of the software.

MSc Hans Verkerk, Senior Researcher, is specialised in forest resource modelling, sustainability and goods and service assessments, particularly with the EFISCEN model. He is/was involved in projects such as SENSOR, EXIOPOL, VOLANTE and EUwood. He recently analysed Land Use, Land Use Change and Forestry (LULUCF) projections with the EFISCEN model as input to climate negotiations of EU member states in cooperation with the Joint Research Center in Ispra.

Dr. Bernhard Wolfslehner, Head of Office, EFI Central-East European Regional Office – EFICEEC, has over 10 years of research experience in sustainable forest management, indicator development, and multi-criteria analysis. He has been in the development group of the Multi-criteria analysis tool in EFORWOOD and participated in several projects on sustainability issues and forest goods and services. In the OPERAs project he is coordinating the ecosystem service trade-off analysis.

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Partner 7: Prospex – Prospex bvba

Prospex bvba (limited) is a pioneer in participatory processes for the involvement of stakeholders (<u>www.prospex.be</u>). Prospex builds its practice on its unique competencies in applied participatory methods for foresight (such as scenarios, visions, roadmapping), in the tailor-made, thorough design of human interaction processes (such as for conferences, workshops and training course settings), and in the outstanding knowledge, facilitation and human relation skills of its network of top-level facilitators and trainers. Prospex' facilitators and trainers have applied this competence for a variety of clients in diverse settings, including public institutions (such as OECD, World Bank, IEA, EC, EEA, European Training Foundation, European Patent Office, Governments of Netherlands, Germany, Albania, Libanon, etc.), private enterprises (such as DHL, Novartis, Toyota, Coca Cola, Electrabel/Suez, Novartis, Qatar Telecom, Vodafone, etc.) and NGOs (National Committee on Burundi, Mongolian Foundation for Open Society, etc.).

Prospex has designed and facilitated a long series of participatory multi-stakeholder foresight processes in combination with top level international research projects. These include scenarios on the future of land-use in the EU (PRELUDE project of the EEA), the future of water resources in Europe (EU SCENES project), energy efficiency in buildings (WBCSD), RUBICODE (FP 6) and the future of water in the Middle East (GLOWA project, involving high level participants from Jordan, Israel and Palestine in joined workshop settings), and the future of multi-sector pandemic preparedness (ASEM/ASEF - Asia-Europe Foundation). Prospex has also designed and facilitated a long series of international & interactive conferences such as the EEA SCP conferences and the 2008 Bridging the Gap conferences (EEA, EC DG Research and DG Environment, JRC, Slovenian Government). Prospex is assisting the EEA in the development of the State of Environment Report 2010 and is preparing for the CLIMSAVE project on climate change adaptation (EU FP 7). Prospex's responsibility in this project encompasses the preparation, design and delivery of the professional facilitation of stakeholder workshops in this project (WP5), leading Task 5.2.

Dr. Marc Gramberger, a political scientist by education, and an authority in designing and implementing successful multi-stakeholder engagement processes – he is the author of the official OECD handbook "Citizens As Partners" on public participation in policy-making (OECD, Paris, 2001. ISBN 92-64-19540-8), published in more than 10 languages. Before founding Prospex, Marc Gramberger has been a consultant with the Global Business Network (GBN) - one of the originators of qualitative scenario methodology -, and with the European Commission in Brussels (Task Force on the Introduction of the Euro). He is a former project director at the European University Institute (EUI) in Florence, Italy. He has been leading the stakeholder engagement in projects such as GLOWA, ASEF, CLIMSAVE, RUBICODE, PRELUDE, VOLANTE etc. mentioned above.

Dr. Steven Libbrecht holds a PhD in physics and is a senior consultant on foresight, scenario, roadmapping and innovation processes. He is currently developing future technology roadmaps for the International Energy Agency (IEA). He has worked for companies such as Unilever, Qatar Telecom, Janssen Pharmaceutica, Sandoz/Lek, and bodies of the European Union such as the

European Training Foundation (ETF) and the European Environment Agency (EEA). Senior consultant

Peter Rakers is a clinical chemist by education and specialises in the effective design and facilitation of multi-stakeholder processes. Peter has worked with a variety of international firms such as in the pharmaceutical sector, where he also held management and leadership positions. He is a facilitator with several programmes of the Rotterdam School of Management (Erasmus University) an a senior consultant for the Asia Europe Foundation's (ASEM-related) foresight process on multi-sector pandemic preparedness in Asia and Europe.

Partner 8: WCMC – World Conservation Monitoring Centre

The UNEP World Conservation Monitoring Centre is acollaboration between the United Nations Environment Programme and WCMC, a UK-based charity. It undertakes synthesis, analysis and dissemination of global biodiversity knowledge, providing authoritative, strategic and timely information for conventions, countries, organizations and companies to use in the development and implementation of their policies and decisions. The Centre has been in operation for 30 years, providing objective, scientifically rigorous products and services to help decision makers recognize the value of biodiversity (as a contribution to ecosystem services and natural capital) and apply this knowledge to all that they do. WCMC will co-lead WP5, co-lead Task 4.2 (Information tools and data) and Task 5.1 (Resource Hub) and contribute to Tasks 4.2, 4.4 and 4.5 and WP6.

Dr Matt Walpole is Head of the Ecosystem Assessment Programme. He specialises in biodiversity and ecosystem service indicators and assessments (including valuation, mapping, modelling and scenarios) from local to global scales. He oversees the CBD-mandated Biodiversity Indicators Partnership and directed the UK National Ecosystem Assessment (2009-11 and its follow-up (2012-13). He has managed and worked on a number of ENRTP projects and other contracts for the EC.

Dr. Claire Brown is a Senior Programme Officer with expertise in managing multi-stakeholder collaborative assessment processes and capacity-building initiatives. She coordinated the UK NEA and oversees the secretariat of the Sub-Global Assessment that emerged after the Millennium Assessment to share knowledge and develop capacity amongst assessment practitioners. She has worked in a wide range of EU funded projects focusing on policy analysis and the development of reporting tools and is currently advising the EC on the development of a European ecosystem assessment.

Dr. Chloe Strevens specialises in enhancing biodiversity and ecosystem service integration into business sector tools and systems. She has extensive knowledge of assessing biodiversity and ecosystem service criteria in standards and certification systems across different business sectors.

Craig Mills is head of the informatics unit at WCMC. He oversees the development of databases, online reporting tools and web-based user interfaces for biodiversity and ecosystem service information held by WCMC and partners worldwide. He was responsible for the development of the www.protectedplanet.net user interface for the World Database on Protected Areas, which he previously managed, and has been instrumental in the development of the IBAT biodiversity mapping and risk assessment tool used by a range of companies in the mining and minerals and oil and gas sectors (www.ibatforbusiness.org).

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Partner 9: TIAMASG – Foundation for Applied Information Technology in Environment, Agriculture and Global Changes

The TIAMASG Foundation is a non-profit organisation involved in applying information technology in research activities related to the natural environment and global changes. It has significant experience of working within several EC FP projects focusing on the development of software, modelling and software integration, web platforms, including FP5 (ACCELERATES: "Assessing Climate Change Effects on Land use and Ecosystems: from Regional Analysis to The European Scale" and MULINO: "MULti-sectoral, INtegrated and Operational decision support system for sustainable use of water resources at the catchment scale") and FP6 (NOSTRUM-DSS: "Network on gOvernance, Science and Technology for sustainable water ResoUrce management in the Mediterranean. The role of DSS tools" and ADAGIO: "ADAptation of aGriculture in european regIOns at environmental risk under climate change"). Currently TIAMASG is involved in the CLIMSAVE (Climate Change Integrated Assessment Methodology for Cross-Sectoral Adaptation and Vulnerability in Europe) FP7 project. TIAMASG will co-lead Task 5.1 (Resource Hub), will contribute to Task 4.3 (Information exchange and decision support), 4.4 (Indicators, Auditing and Accounting Systems, Benchmarking, Monitoring, and Certification), 5.2 (Stakeholder engagement and facilitation), 2.2 (Exemplar case-studies - for Romania) and in the dissemination part of WP6 (Outreach)

Math. George Cojocaru is a Senior Research Fellow trained as a computer scientist at the College of Mathematics, Iasi (Romania) and has 21 years of research experience in Romanian several European research organizations. He has extensive experience in software development and integration, web applications, projecting databases and GIS systems, integrating simulation models, programming, and the development and testing of systems. He has participated in numerous national and international projects, including the EC-funded projects ACCESS, IMPEL, MULINO, ACCELERATES, STAMINA, NOSTRUM, BRAHMATWIN, RUBICODE, ADAGIO and CLIMSAVE (as deputy coordinator).

Dr. Catalin Simota, Senior Research Fellow is a member of the Romanian Academy of Agriculture and Forestry Science. He holds a degree in Physics and a PhD in Natural Sciences. His research activities cover the modelling of the dynamics of environment using mathematical models and he was the scientific coordinator of the EC SIDASS project. He has published 36 scientific

papers in this domain, most of them through international collaboration, and he has participated in 9 EU-funded projects

Ms. Diana Hanganu is researcher in the last year of the Ph.D in the field of "Physical Geography" at the University of Bucharest, Faculty of Geography. She has a Master's degree in the field of study related to "Environmental Change" and "Regional Development" and she worked in research stages at School of Geography-University of Southampton and at Geology and Mineralogy Institute-University of Köln.

Dan S. Radu holds a university degree in Physics and he is trained as software web developer and system engineer developing web instruments (e-learning platforms, websites) in national and EU funded projects including RUBICODE and CLIMSAVE.

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Partner 10: IEEP – Institute for European Environmental Policy

The Institute for European Environmental Policy (IEEP) is an independent not-for-profit research organisation concerned with policies affecting the environment in Europe and beyond. Our broad and interdisciplinary focus on European policy making is shared by few and we have a reputation based on being first in the field and possessing a history of knowledge and involvement acquired over thirty years. We undertake research and consultancy on the development, implementation and evaluation of environmental and environment-related policies in Europe. Our aim is to disseminate knowledge about Europe and the environment and to analyse and present policy options. Our research work involves both pressing short-term policy issues and long-term strategic studies. We work closely with the full range of policy actors from international agencies and the EU institutions to national government departments, NGOs and academics. IEEP will lead Task 4.1 (Demands for ES/NC instruments) and contribute to Tasks 3.3, 3.4, 4.1, 4.4, 4.5 and 5.2.

Patrick ten Brink is a senior fellow at IEEP and Head of the Brussels Office. Patrick has an MSc in Environmental and Natural Resource Economics from University College London. He leads IEEP work on environmental economics with particular focus on biodiversity valuation, market based instruments, both on subsidies and subsidy reform, as well as the use of taxes and charges.

Patrick coordinated The Economics of Ecosystems and Biodiversity (TEEB) in National and International Policy initiative (See refs below).

Marianne Kettunen is a Senior Policy Analyst at IEEP. Marianne has an MSc on ecology and biodiversity research from the University of Turku (Finland) and ten years of expertise in issues related to the EU and international biodiversity policy. At IEEP Marianne is especially focused on assessing the socio-economic importance of biodiversity and ecosystem services and supporting the integration of these aspects into policies and decision-making processes (e.g. under the TEEB-initiative).

Dr Andrew Farmer is the Head of the Industry, Waste and Water Programme at IEEP with a PhD in ecology from St Andrews University. At IEEP Dr Farmer has a particular interest in the role of different policy instruments for delivering environmental outcomes, including the analysis of instruments underlying the better regulation agenda. Dr Farmer has published the following books: Managing Environmental Pollution, published in 1997 by Routledge; and a Handbook of Environmental Protection and Enforcement, published in 2007 by Earthscan. He is the Editor of the Manual of European Environmental Policy published by Earthscan in 2010.

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Partner 11: UCD – University College Dublin

University College Dublin (UCD) is a dynamic, modern university where cutting-edge research and scholarship provide a stimulating intellectual environment and a strong research ethos. The School of Geography, Planning and Environmental Policy and the School of Architecture, Landscape and Civil Engineering both combine academic with professional education and the creation of knowledge with its application in the real world. Each discipline draws on the approaches and techniques of the others and is enriched by this interaction while maintaining its own integrity. The research clusters in each School are interdisciplinary in nature with a wide variety of theoretical approaches, involving academics with a background in political geography, urban geography, biophysical sciences, sociology, public health, regional and urban planning, rural development, transport planning, surveying and urban economics, and environmental economics. UCD will lead Task 3.3 (Social and cultural values of ES) and contribute to the Tasks in WP2, WP4 and WP6.

Dr. Marcus Collier is a Research Fellow with nearly 20 years as an environmental scientist, specialising in landscape planning, assessment and management within a framework of community participation and collaboration. He is co-ordinator of the EU-funded TURaS Project and has collaborated on other EU-funded projects such as KnowSeas (FP7) and GEOSPECS (ESPON).

Dr. Craig Bullock is a Research Fellow and environmental and socio-economist, specialising in cost benefit analysis, biodiversity and natural resource valuation, environmental preferences and environmental policy. He is currently responsible for projects on the application of the Environmental Liability Directive in Ireland and the cost benefit analysis of climate change adaptation. He was previously the co-ordinator of the FP4 project Greenspace on the benefit and value of urban green areas.

Dr. Louise Dunne has extensive experience partaking in and co-ordinating projects with multiple partners. She managed the Irish contribution to PETRAS (FP6) and administered and co-ordinated CATEP (FP6) and TURaS (FP7). She has ten years experience in liaising with Funding Bodies, most notably DG Research, DG Environment, Irish Environmental Protection Agency and other national funding bodies.

Prof. Zorica Nedović-Budić is Professor of Spatial Planning and Geographic Information Systems. She has served on the Board of Directors of the Urban and Regional Information Systems Association (URISA) and the University Consortium for Geographic Information Science (UCGIS), and as the book reviews co-editor for the Journal of the American Planning Association. She is currently an editorial board member of URISA Journal, International Journal of Spatial Data Infrastructure, Territorium and International Journal of Knowledge-Based Development.

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Partner 12: CNRS - Centre National de la Recherche Scientifique, France

CNRS, the French national centre for scientific research, is a public research organisation with approx. 32000 employees in more than 1,200 service and research units throughout the country. Inter-disciplinary programs and actions offer a gateway into new domains of scientific investigation and enable CNRS to address the needs of society and industry. In 2009, CNRS created the Institute of Ecology and Environment (INEE), which fosters research in the fields of ecology and environment, including biodiversity and interactions between humans and environment.

The Laboratoire d'Ecologie Alpine is the leading French laboratory in alpine ecological research. Total staff is 33 scientists, 20 technical and administrative staff, and 32 post-docs and PhD students. LECA leads projects on the response of biodiversity and ecosystem functioning to climate, land use and other drivers. Research focuses on: analyzing global change effects on biodiversity and quantifying the impacts of these changes on ecosystem functioning; modelling ecosystem dynamics in relation to scenarios of global change; translating changes in biodiversity and ecosystem functioning into changes in ecosystem services identified with participative and interdisciplinary methods. A strong interdisciplinary approach is achieved through the staff's variety of expertise and their collaboration networks. Based on its expertise on various ecological aspects of biodiversity and ecosystem services CNRS will co-lead Task 3.1, and participate in Task 2.2 (leading the mountain case study) and Task 3.3.

Dr Sandra Lavorel is a Senior Research Scientist (DR1) of CNRS. She is an ecosystem ecologist with expertise in the coupled dynamics of land use, biodiversity, ecosystem function and services in the context of environmental change. She has been a member of Scientific Committees within IGBP

since 1997 and within Diversitas since 2007. Dr Sandra Lavorel has published more than 120 papers in international indexed journals, and is one of the most cited ecologists world-wide. She is one of the leading French experts for governmental actions on biodiversity and ecosystem services. She has participated in a number of EU-funded research projects including FP5 VISTA and BiodivERsA VITAL (both as coordinator), FP5 ATEAM and AVEC, FP6 RUBICODE, FP7 VOLANTE and BiodivERsA CONNECT.

Key references

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Diaz S, **Lavorel S**, De Bello F, Quétier F, Grigulis K & Robson TM 2007 Incorporating plant functional diversity effects in ecosystem service assessments. Proceedings of the National Academy of Sciences 104:20684-20689

The Institut Méditerranéen de Biodiversité et d'Ecologie marine et continentale (IMBE) is a new Joint Research Unit, created January 1, 2012, with the explicit aim to develop new approaches for science-based integrated management of biodiversity and ecosystems. With 200 staff members organized in 14 research teams, IMBE combines basic and applied biological field research with new approaches of modelling ecosystem processes at the continental scale. IMBE's current research potential covers the domains of biodiversity, evolutionary biology and ecology, and human-environment relationships. Based on its founding laboratories' experience (IMEP and DIMAR) IMBE provides crucial expertise for the monitoring and analysis of biodiversity to local and regional stakeholders in the public and private sector. IMBE contributes to the conceptual work in WP3, coordinates the Mediterranean and contributes to the European exemplars (Task 2.2), and organizes the OPERAS Summer School (WP6)

Professor Dr Wolfgang Cramer, geographer and plant ecologist, has helped establish the Potsdam Institute for Climate Impact Research (PIK) in 1992 and has served as department head there until 2011, when he joined CNRS as one of the two founding scientific directors of IMBE. After contributions to forest dynamics modelling focusing on climate drivers, he has worked the last 20 years on the broader understanding of biosphere dynamics at the global and continental scale, including aspects of natural and human disturbance as well as biodiversity. For the EU FP5, he has coordinated ATEAM and its companion outreach activity, AVEC. Together, these projects have resulted in the first ever region-specific and comprehensive ecosystem service assessment across Europe, communicated through the scientific literature as well as through an intensive stakeholder dialogue. Professor Cramer currently has an ISI h-factor of 34, is a lead contributor to the IPCC (Peace Nobel Prize 2007), co-authored the Millennium Ecosystem Assessment and is engaged in the international science networks DIVERSITAS and GEO BON.

Dr Alberte Bondeau, a physicist, remote sensing expert and ecosystem modeller, has 20 years postdoctoral experience in quantifying the functioning of agricultural systems at the global scale. From 1995 to 2011, she worked at PIK and is the key developer of the agricultural crop component in the generic global ecosystem model LPJmL. She has contributed to several key European research projects including ATEAM, CarboEurope-IP, GHG-Europe and others.

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Bondeau A, Smith PC, Zaehle S, Schaphoff S, Lucht W, **Cramer W**, Gerten D, Lotze-Campen H, Müller C, Reichstein M, Smith B 2007 Modelling the role of agriculture for the 20th century global terrestrial car-bon balance. *Gl Ch Biol* 13:679-706

Sitch S, Smith B, Prentice IC, Arneth A, **Bondeau A, Cramer W**, Kaplan JO, Levis S, Lucht W, Sykes MT, Thonicke K & Venevsky S 2003 Evaluation of ecosystem dynamics, plant geography and terrestrial carbon cycling in the LPJ Dynamic Global Vegetation Model. *Gl Ch Biol* 9:161-185

Partner 13: UP - University of Potsdam

The University of Potsdam, founded in 1991, has quickly developed into one of the leading middle sized universities in Germany combining its own research capacities with a range of non-university research institutes, including the Potsdam Institute for Climate Impact Research (PIK). Aiming to maximise synergies between the high-profile environmental and earth sciences conducted in Potsdam, the Institute of Earth and Environmental Science of the University of Potsdam (http://www.geo.uni-potsdam.de/home-799.html) is core of a number of formal initiatives to actively support the interdisciplinary collaboration of university and non-university research institutes, such as the focus domain on Earth Science and Integrated Earth System Analysis (http://www.geo.uni-potsdam.de/earthscience/index.html), the Potsdam Research Cluster for Georisk Analysis, Environmental Change and Sustainability PROGRESS (http://earth-inprogress.de/index.35.de.html) Potsdam Research Network PEARLS (http://unior potsdam.de/english/profile/pearls.html). Similar to most of these initiatives the group of Landscape Management focuses strongly on integration and assessment of important insights gained in the research domain in decision-making processes. The university has a longstanding record of successfully completing national and international research projects including the administration of European projects during the 6th and 7th framework programme.

University of Potsdam will lead Work Package 2. It will contribute scientifically to Task 2.2 with an exemplar investigating Global Mechanisms for Climate Protection and Habitat Conservation, to the

exemplar synthesis in Task 2.3, to Social and Cultural Values of ES in Task 3.3 and, with the hands-on experience gained mostly in WP2 Practice and WP3 Knowledge, and also to WP 4 Instruments.

Prof. Dr. Ariane Walz has recently started as a junior professor for Landscape Management at the Institute of Earth and Environmental Science, Univ. of Potsdam, and is also visiting scientist of the Group of Ecosystem Stability and Dynamics within PIK. Her research focuses on landscape management with a special emphasis on combining computer-based tools and participatory approaches for estimating and evaluating the impact of land use and climate change on the provision of ecosystem services.

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Partner 14: ETH – Eidgenössische Technische Hochschule Zürich

The ETH Zürich (ETH) is an engineering, science, technology, mathematics and management university in the City of Zurich, Switzerland. ETH has more than 17,000 students from approximately 80 countries, 3,800 of whom are doctoral candidates. More than 400 professors teach and conduct research in the areas of engineering, architecture, mathematics, natural sciences, system-oriented sciences, and management and social sciences. ETH Zurich regularly appears at the top of international rankings as one of the best universities in the 21 Nobel Prizes have been awarded to students or professors of the Institute in the past, the most famous of them being Albert Einstein in 1921, and the most recent being Richard F. Heck in 2010. The recently chair PLUS (Planning of Landscape and Urban Systems) focuses on developing and testing innovative decisionsupport and planning systems balancing the use of natural resources against their availability in order to insure the ability of future generations to meet their own needs. The research includes fundamental contributions to new spatial decision-support systems integrating the value of ES, spatial modeling in landscape planning with new approaches such as backcasting, inverse techniques and data assimilation, and 3D visualizations of landscapes in participative approaches for human-agent modeling. The new state-of-the-art Landscape Visualization and Modeling Lab allows producing increasingly sophisticated and realistic 3D visualizations and interactive real-time 3D landscape visualizations for participative workshops at multiple scales. ETH will lead Task 4.3 (Decision making tools) and contribute to Tasks 2.2, 4.4, 4.5 and 5.1.

Prof. Adrienne Grêt-Regamey is Professor of Landscape and Environmental Planning. She specialises in spatial modelling, the development of spatial decision support systems, and GIS-based landscape visualizations. She contributed to many recent research projects integrating ecosystem services into spatial planning processes and instruments, economic assessments and institutional arrangements (e.g. Natural capital/TEEB Germany, Valuing Biodiversity with ecosystem services, Ecosystem services-based planning tools for Switzerland, NRP48 – ALPSCAPE, NRP61-Hydrological ecosystem services, NRP54 – Ecosystem services in agglomerations, NRP65 – Sustainable urban patterns, MOUNTLAND I and II)

Dr. Ulrike Wissen is a Senior Research Fellow in Landscape Planning with expertise in the assessment and management of landscape change, GIS-based 3D landscape visualizations, and

participative planning. She ha worked in several projects developsing, applying and iteratively enhancing the application of 3D visualizations in collaborative platforms (VISULANDS, NRP65 – Sustainable Urban Patterns, VisaSim).

Dr. Christian Hirschi is a Senior Researcher and Lecturer at the Institute for Environmental Decisions and the Department of Environmental Systems Science at ETH Zurich. His research focuses on environmental politics and natural resource management with a specialization on the analysis of political processes and the evaluation of policy outcomes.

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Partner 15: WWF Bulgaria – WWF Danube-Carpathian programme Bulgaria

WWF Danube-Carpathian Programme is part of the global WWF network and has been active in the region since 1998 to promote the conservation, restoration and sustainable management of natural resources of two of the world's 200 most valuable ecological regions, Danube River basin and Carpathian Mountains. We run 5 main conservation programmes – Freshwater, Forests, Natura 2000 and Protected Areas, Green Public Funds and Climate Change. We work on the national level through policy, advocacy, awareness raising, fostering stakeholder dialogue, education, training, capacity building an communications; as well as on the local level through model activities in our main program region – Bulgarian Danube river basin. The organisation is also well-connected to policy makers nationally, regionally, and at EU level and regarded as an influential promoter of EU policy. WWF Bulgaria will contribute to Tasks 2.1 and 2.2.

Vesselina Kavrakova – Senior Environmental Policy Expert, Country Manager of WWF Bulgaria. She gained two MSc degrees, one in Ecology and one in Environment Sciences & Policy from Central European University. She has been the driver of the organisation in Bulgaria since its establishment, in which she took an active role. Before stepping in as manager of the organization, she was in charge of the Freshwater/Danube and Natura 2000 programs of the organization. She plays a strong lobby work and promotes the work of WWF DCP among national, regional and international communities.

Stoyan Mihov – Fisheries Expert. He holds an MSc in Ecological Modelling and Expertise and is based in Belene, the location of the biggest wetland area of Bulgaria. As an ichthyologist, he has excellent knowledge of Danube fish species and has been working on wetland management and conservation since 1999. His recent work focuses on pilot restoration of marshes in Persina Nature Park and protection of the Danube sturgeon.

Ivan Hristov – Water Policy Expert, WWF Bulgaria Freshwater team leader. He holds an MSc in Ecology He has extensive experience and knowledge in management and implementation of conservation projects on wetland and river bed protection and restoration, including monitoring of

waterfowl birds and fish species. Ivan also works on policy issues and advocates for sustainable water use and management at national level.

Yulia Grigorova – Senior Agriculture Expert. She holds an MSc in Business Management and has excellent knowledge of EU directives and procedures related to agriculture and rural development policies as well as the relevant Bulgarian legislation. She participated in the working groups for agri-environment and Natura 2000 measures in the Bulgarian Rural Development Plan 2007-2013. Yulia also works on payments for ecosystem services and was one of the key persons in the development of national Agri-environmental payments.

Maya Todorova – Senior Ecosystem Services Expert. She holds an MSc in Business Management and Marketing. She leads WWF DCP's work on developing economic tools for nature conservation, including PES and other sustainable mechanisms for nature conservation. Maya also works in one of WWF DCP Bulgaria's priority areas – Rusenski Lom.

Konstantiv Ivanov – Senior Communication Expert, WWF Bulgaria Communications Coordinator. He holds a MA in Journalism. . He has excellent knowledge and experience in various communication activities both as journalist and as public relations manager. He works with local, regional and national media and correspondents of Bulgarian media in Brussels for the organization and implementation of communication campaigns.

Key publications

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Todorova, M., **Grigorova**, Y. and Kazakova, Y., August 2007. Complementary financing for Environment in the context of Accession - Innovative sources', national level analysis: Bulgaria, WWF DCP, Vienna/Sofia, in English language

Partner 16: WWF Romania – WWF Danube-Carpathian programme Romania

The WWF Danube-Carpathian Programme has been active in Romania since the early 1990s but was officially registered in 2006 to conserve the natural environment and ecological processes in Romania and to contribute to science-based nature conservation in the Danube Carpathian Region. Conservation activities initially focused on the Danube Delta and Lower Danube, but since then have expanded significantly into a comprehensive programme. Significant emphasis is put on public communications and awareness rising, e.g. through media work, campaigns, business engagement, educational programmes and national public events. WWF DCP Romania has excellent contacts to governmental stakeholders in nature conservation and green economy aspects, both nationally and throughout the Danube basin._WWF Romania will contribute to Task 2.2 (Exemplar case-studies).

Dr. Orieta Hulea – Senior Freshwater Expert, Head of WWF DCP Freshwater Programme. She holds an MSc and a PhD degree in Biology and has over 10 years of experience of working in science- based nature conservation and water related policies in the Danube region. She has contributed to the design of the Integrated Monitoring System of the Danube Delta Biosphere Reserve and techniques for data validation and integration through GIS tools in a decision making system).

Dr. Cristian Tetelea - Freshwater Expert. Since 2007, he has been coordinating the nature conservation and wetland restoration projects of WWF along the Lower Danube and Danube Delta. He has excellent experience of working with various stakeholders in the region, especially with local communities and local governments. He holds an MSc and PhD in river ecology and he is experienced in using GIS tools and techniques.

Monia Martini – Payment for Ecosystem Services expert. Since 2009, she has been working with economic tools for nature conservation and coordinating policy work in Romania. She has excellent knowledge of national and EU policy in the field of agriculture, environment, sustainable development, and nature conservation. Monia holds an MSc in European public relations.

Raluca Dan – Rural Development Expert. Since 2007, Raluca has been involved in policy work in Romania with a focus on green infrastructure and cohesion policy. She has excellent relations to stakeholders in the sphere of rural development and nature conservation and holds an MSc in Ecology.

Ioana Betieanu – Communication expert. Since 2008, she has been coordinating the communication work of WWF in Romania. Her experience includes work with national media, social media and concept-drafting, implementation and monitoring of national campaigns of WWF on water and other ecosystems. She holds an MSc in Management and Communication.

Key publications

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Suzanne Ebert, **Orieta Hulea**, Bart Wickel, 2009, Floodplain restoration along the lower Danube (Romania, Ukraine): a climate change adaptation case study, Climate and Development, Volume 1, Number 3, p. 212-219 (8)

Orieta Hulea, Christine Bratrich, 2010, Chapter in:,,Arguments for Protected Areas, Multiple Benefits for Conservation and Use, Edited by Sue Stolton and Nigel Dudley, published by Earthscan, Case study 6.2.,,Restoration and Protection Plan to Reduce Flooding in the Lower Danube,,

Cristian Tetelea (2003) – Integrating conservation actions in protected areas management in Romania. Case study: the Iron Gates Natural Park, Proceedings of the First International Conference on Environmental Research and Assessment, University of Bucharest, Romania.

Cristian Tetelea (2005) – *Interactive use of GIS in geo-ecological analysis*, HERODOT Thematic Network volume of the GIS workshop and seminar programme, Liverpool Hope University College, Liverpool UK

Partner 17: S·G·M sl

SGM was founded in 1999, as a consultancy oriented to fill the gap between landscape ecology, territorial planning, and environmental optimization of infrastructures. The progressive proliferation of NIMBY societal issues linked to public works and environmental issues has raised an increasing interest on the social media strategy as a way to solve problems. This is the reason why SGM has a lot of contents in social media platforms as Slideshare, Youtube, etc. Its basic strength is the use of GIS analysis capabilities and landscape ecology methodology, to transform data in useful information for territorial planning and infrastructure policies. So our clients are different administrations as well as private companies. Among recent projects, a crowdmap of ecological connectivity (www.caminsdefauna.cat) can be highlighted. This project consists in gathering crowdsourced georeferenced data on faunal passage evidences in road underpasses and bridges. The georeferenced data collected mainly by smartphones are introduced in an open data geodatabase

that is compliant with the INSPIRE directive. On November 2010 SGM organized a workshop on coastal dune management in cooperation with the European Union for Coastal Conservation EUCC and the European Sand Dune and Shingle Network. The relationship with sand dunes begins at 1992, when José Lascurain designed, coordinated and managed the Spain's first coastal promenade which introduced natural sand dunes, as the central landscaping aspect of the project. Leads the Coastal dune exemplar case-study in Task 2.2.

José Lascurain, biologist. 20 yrs experience in environmental management of projects and urban planning. Among this projects, the first coastal promenade with constructed sand dunes in Spain (1992).

Anna Ferrés, geographer and GIS analyst. Rijksuniversiteit Utrecht (Holand). 9 years of experience on GIS analysis and cartography.

Glòria Feiu, lawyer. 10 yrs experience on ISO Environmental management.

Key references

Link to "Workshop "Metropolitan dune systems management. A european approach" organized by SGM: http://youtu.be/1ACO4DEAVSE

Link to a recent crowdsourcing campaign: www.caminsdefauna.cat

A general reference of the 14 yrs SGM history can be reached at www.sgm.cat

Partner 18: FFCUL – The University of Lisbon

The Fundação da Faculdade de Ciências da Universidade de Lisboa (FFCUL) is a private non-profit organization, created in 1993, as an initiative of the Faculty of Sciences, in order to manage financial and administratively its R&D projects. FCUL acts as a third party in those R&D projects based on a scientific agreement in force since FFCUL's establishment, which acts as the front institution for a Portuguese scientific collaboration of multiple research groups (research centres for different fields, such as Biology, Information Technology, Statistics, etc), with more than 400 ongoing projects. Many of these R&D activities are developed together with international teams and are funded both at national and European levels. Its main purposes are to promote research and technological development activities, provide qualified human resources training and offer consulting expertise and knowledge dissemination. The 'Centro de Biologia Ambiental - CBA' (http://cba.fc.ul.pt), managed by FFCUL, is a leading research institution for biodiversity, conservation biology and environmental issues in Portugal. FFCUL will mostly contribute to Task 2.2 (Exemplar case-studies)

Prof. Dr. Margarida Santos-Reis – Professor at the Animal Biology Department she teaches several courses (Biology degree and MSc in Conservation Biology), is the coordinator of CBA and leaded the creation of the Portuguese LTER network being the site coordinator of LTER-Montado. Her main domain of interest is conservation ecology but also inter-disciplinary themes such as human-wildlife conflict, sustainability of cork-oak ecosystem, and ES.

Prof. Dr. Cristina Máguas – Professor at the Plant Biology Department she teaches courses (Biology degree and MSc in Ecology and Environmental Management), coordinates the Environmental Stress and Functional Ecology research group at CBA and is the Head of the SIIAF.

Her main research interests are ecophysiology and isotopic ratio mass spectrometry, ecology of Mediterranean ecosystems, environmental indicators and invasion ecology.

Prof. Dr Rui Rebelo – Professor at the Animal Biology Department he teaches several courses (Biology degree and MSc in Conservation Biology). He is also a member of the Animal Diversity and Conservation research group at CBA and the representative in Portugal of DAPTF (IUCN – SSC). His main research interests are Invasion Ecology, Cork-oak woodland ecology and management, with a main focus on amphibians and reptiles.

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Partner 19: ECM - Ecometrica

Ecometrica is a company of specialists and experts in ecosystem service assessment, remote sensing, climate change policy, greenhouse gas (GHG) accounting and web based programming. Our mission is to make accounting for ecosystem changes and GHG emissions accessible to all organisations, including business and government, through web-based services that distil our knowledge and experience. Ecometrica has 20 staff based in Edinburgh, UK and Montreal, Canada. We have a strong track record in undertaking collaborative research projects with the University of Edinburgh. Ecometrica will contribute to Task 4.2 (Information tools and data) and 5.1 (Resource Hub). The focus of their contribution will be based on their expertise in the provision of web-based land use and ecosystem applications that enable access, sharing, organisation and querying of spatial data.

Dr. Richard Tipper is CEO of Ecometrica. He has responsibility for managing and developing a team of analysts and researchers with complementary expertise in environmental change assessment, spatial data management and analysis, and web-based software development. He was Lead Author on the IPCC Special Report and Land Use, Land Use Change and Forestry, and he was subsequently a Lead Author on the IPCC Good Practice Guidelines for Agriculture, Forestry and Land Use.

Dr. Karin Viergever is a Remote Sensing (RS) and Geographic Information Systems (GIS) Specialist. Karin has 10 years' experience with the application of RS and GIS data and methods on projects related to land cover, environmental monitoring and ecosystem services. Using a wide variety of optical and radar remote sensing data, her project experience includes mapping and monitoring of forest and agricultural areas, historical land cover change analysis and mapping of biomass distribution in forest carbon project areas. She is also involved in the development in Ecometrica's online data sharing and mapping platform, Our Ecosystem.

Neha Joshi is a GIS Analyst. Neha has project experience in quantifying deforestation and degradation for the Mozambican REDD National Strategy. This project involved the analysis of land use change using data from optical and radar remote sensing sensors, mapping, forest inventorying and GIS. She has also worked on the Mpingo Conservation Project in Tanzania, providing integrated analysis of land cover change and land use practices to evaluate the potential of carbon credit generation through REDD.

Matthew Brander is a Senior Analyst. He has over five years' experience in climate change policy and project appraisal. He has recently worked on projects for the UK's Department for Energy and Climate Change, the Department for Transport, the Renewable Fuels Agency, the Scottish Government, the Food and Climate Research Network, and a consortium research project funded by the Natural Environment Research Council.

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Partner 20: BIOTOPE

Created in 1993 by a team of conservation biologists and communications experts, BIOTOPE is now the leading French company for biodiversity and ecosystem service assessment, nature conservation planning, and natural history communication and publishing. BIOTOPE has considerable experience in the operational assessment of biodiversity and ecosystem services for a wide range of private and public sector clients. The company routinely carries out environmental impact assessments for both development projects and planning documents, for areas ranging from administrative regions to small scale nature reserves. Work on this project will benefit from the company's intimate experience of the constraints of assessing ES/NC under time, budget and data constraints, as well as its knowledge of the needs and expectations of end-users: private and public decision makers and their stakeholders. BIOTOPE will contribute to Task 4.2 (operational potential), Task 4.3 (information exchange and decision support), Task 4.4 (indicators, auditing and accounting, etc.) and Task 4.5 (legal, financial and market instruments).

Dr. Fabien Quétier is a senior consultant in the nature conservation department, where he specializes in the design, sizing and on-the-ground implementation of nature conservation actions aimed at offsetting development impacts on biodiversity and ecosystem services. He has

contributed to several international projects on interdisciplinary ecosystem service assessment and modelling (e.g. EU-funded VISTA).

Dr. Florence Baptist is a researcher in the research and development department. She has coordinated a government funded evaluation of the impacts of climate change on biodiversity and ecosystem services in aquatic ecosystems in France (Explore 2070) and worked with local authorities on several ecosystem service assessments.

Cédric Elleboode is a senior consultant specialized in GIS. He has developed software for assessing land-use and land-cover changes that includes connectivity metrics. He is currently in charge of various projects which address the identification and the management of wildlife corridors as part of planning documents.

Nancy Sibora is a senior consultant with considerable experience in environmental impact assessment of both projects and planning documents. Specifically, she will contribute expertise on the needs and expectations of local government administrations.

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Partner 21: IODINE SPRL

IODINE is a new SME created in 2011 by informatics and GIS expert Bruno Danis and environmental economist Rob Tinch, aiming to develop research and consultancy in biodiversity science and the development of web tools and software for improving analysis, understanding and management of biodiversity and natural resources. IODINE will develop the framework for evaluating costs and benefits of instrument implementations (Task 4.4) and will work on improved methods of integrating CBA of ES in wider decision support contexts (Task 4.3)

Dr Rob Tinch has 18 years' experience in environmental and ecological economics, working in the public, academic and private sectors. He has contributed to or led work packages on several European research projects, including EUROWET, RUBICODE, and four ongoing projects, HERMIONE, SPIRAL, CLIMSAVE and BESAFE, and was a lead author on the TEEB Quantitative Assessment. His other work is primarily for public bodies and charitable organisations (DG Environment, UNEP-WCMC, Defra, WWF ...) and focuses on biodiversity, ecosystem services, environmental valuation and decision support.

Dr. Bruno Danis is a marine biologist and IT expert working on the coordination of information networks. He coordinates the Scientific Committee on Antarctic Research (SCAR) Marine Biodiversity Information Network and is the manager of the new ANTABIF (Antarctic Biodiversity Information Facility, www.biodiversity.aq). He is deputy Chief Officer of the Standing Committee

on Antarctic Data Management (scadm.scar.org) and also works as a consultant for GBIF, coordinating the development of an open-source bioinformatics suite (www.nodesportaltoolkit.org).

Dr. Jane Powell is a Lecturer in the University of East Anglia and director of Environmental Futures Ltd (UK). She is an international expert on life cycle assessment, working primarily on waste, packaging and energy issues. Dr Tinch and Dr Powell work together regularly, and for OPERAS Dr Powell will work as an in-house consultant for IODINE sprl.

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Partner 22: Denkstatt - denkstatt Bulgaria OOD

Denkstatt Bulgaria is the premier consultancy in the country in the field of sustainability and environmental management. We are the local representatives of Denkstatt Group, headquartered in Vienna, Austria. We address a wide range of organizational issues that arise during the decision-making process related to confronting twenty-first century challenges. We assist companies with integrating innovative social and environmental management practices into their core competences. Our clients include companies from different business sectors: mining and metallurgical industry, electronics and electrical engineering, telecommunications, media, food and beverage industry, chemical industry, etc. We also provide services to public authorities such as the Executive Environmental Agency and the River Bain Directorates at the Ministry of Environment and Water. Denkstatt will contribute to WP4 Instruments with a focus on LCA-based approaches, CSR/Sustainability reporting, auditing, standard-setting in certification schemes, supply chain management and others on the interface between nature conservation / institutions and businesses (Tasks 4.2 and 4.3). Other areas of contribution include Tasks 2.3, 3.1 and 3.3 and WP5 Resource Hub.

Boyan Rashev (MSc Environmental and Resource Management): Since 2003, he has worked for environmental NGOs, consultancies and international projects in the fields of climate change, protected area management, valuation of ecosystem services, water management and conservation

financing. After July 2007 to present he is serving as a Managing Partner at denkstatt Bulgaria OOD taking care of the overall company management and overseeing all denkstatt projects.

Klimentina Rasheva (MSc in Public Relations, Certificate Sustainability Assessor): Mrs. Rasheva has experience in public relations working for companies and PR agencies. As a Managing Partner at denkstatt Bulgaria OOD she manages various projects in the field of corporate sustainability, stakeholder engagement, organization of trainings and sustainability communications.

Nikolay Minkov (MSc in Environmental Protection and Sustainable Development): He has background in the area of environmental protections based on half-year working experience for a Bulgarian NGO, dealing with Environmental Impact Assessment reports, air pollution modelling and waste management. His work in denkstatt Bulgaria is orientated to product sustainability, LCA, carbon and water footprint.

Dariya Hadzhiyska (MSc in Environment and Resource Management): She has strong interest and experience in Life cycle analysis, GHG inventories, Corporate responsibility reporting. Before joining the team of denkstatt Bulgaria OOD, she was a trainee at WWF Bulgaria, contributing to projects in the field of climate care.

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Partner 23: CIFOR – The Centre for International Forestry Research

The Centre for International Forestry Research advances human wellbeing, environmental conservation, and equity by conducting research to inform policies and practices that affect forests in developing countries. CIFOR is one of 15 centres within the Consultative Group on International Agricultural Research (CGIAR). It works in more than 30 countries worldwide and has links with researchers in more than 50 international, regional and national organizations. An External Program and Management Review commissioned by the CGIAR concluded in March 2006 that: "CIFOR is considered to be the leading international forest research centre within its mandate and is highly appreciated for its credible and relevant high-quality research. CIFOR is also considered to be a lead CGIAR Centre in terms of communications strategies and effective outreach activities." CIFOR will contribute to Task 2.2 (Exemplars) with case studies on climate change adaptation and mitigation in the tropics. It will also contribute to Task 4.2 (Information tools) and Task 5.1 (Resource Hub).

Dr. Bruno Locatelli is a senior researcher in environmental sciences with a background in forestry, hydrology, and economics. He works with CIRAD in France and CIFOR in Indonesia, where he is based and leads CIFOR's research domain on forests and adaptation to climate change. His research interests include: the role of ecosystem services in people's adaptation, the vulnerability of forests and their ecosystem services to climate change, and adaptation policies and practices. He has experience in ecosystem service modelling and vulnerability assessment in many countries in Latin America, Asia, and Africa.

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Partner 24: CSIC – Agencia Estatal Consejo Superior de Investigaciones Científicas

The Spanish Council for Scientific Research (CSIC) is the largest research organisation in Spain, with over 12,000 employees and 4,000 permanent scientists distributed in 130 institutes, one of them IMEDEA. The research of the Department of Global Change Research at IMEDEA (DGCG) aims at understanding the processes of Global Change and inform the societal responses to address this problem. It emphasizes the interactions between the Atmosphere and the Oceans, and the Biosphere, addressing impacts on climate and atmospheric chemistry and the chemistry and biology of the oceans. The DGCR has extensive experience in EU Framework Programs, as well as in educational programs: Prof. Carlos Duarte coordinates the Postgraduate Program of CSIC in alliance with Menendez Pelayo International University on Global Change. CSIC will contribute to Task 2.2 (Exemplars), Task 2.3 (Synthesis) and Task 3.1 (Ecosystem function and quantification) by providing expertise on marine coastal systems.

Prof. Carlos M. Duarte. Research Professor of CSIC, with expertise in marine biodiversity and biogeochemical processes in the coastal and open oceans. Author of more than 450 papers. He has been involved in several EU funded projects, including the Integrated Project THRESHOLDS (as coordinator), MEDVEG, EUROTROPH, ATP, METAOCEANS, CLAMER and MEDSEA (as deputy coordinator) and the networks of excellence EUR-OCEANS and MarBEF. He leaded several Spanish funded projects, including the MALASPINA Expedition 2010. Member of the Blue Carbon Science Group (IC-UICN). He has received several awards (Hutchinson Award of ASLO, National Research Award on Natural Resources Sciences 2007, Prix of Excellence 2011 of the ICES).

Dr. Núria Marbà. Scientific Researcher of CSIC, with expertise in marine coastal vegetation ecology. She has participated in several EU projects, including WISER (as deputy coordinator), and several Spanish projects. She is author of more than 100 papers. She is a member of the Blue Carbon Science Group (IC-UICN). She is the head of the Department of Global Change Research at IMEDEA.

Dr. Stefan Gelcich is a marine biologist with expertise in the interaction between ecological and social systems in coastal areas, conservation and sustainable use of marine resources. Author of

more than 15 papers published in ecological and social journals. He has participated in several Chilean and international projects.

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Partner 25: UEA - University of East Anglia

Partner terminated

The Centre for Social and Economic Research on the Global Environment (CSERGE) at the University of East Anglia (UEA) is one of the largest and longest established centres of environmental economic research in Europe. Since its establishment in 1991 it has attracted well over £25million of funding and conducted research for International bodies (OECD; EU; CEC); UK Government Departments (Defra; DfT; DoH); UK Official Agencies (NICE; EA; FC; OFWAT); US Agencies (US EPA, US NSF); Industry bodies and companies (UKWIR, multiple utilities); and various consultancy companies. The Centre has produced several hundred papers in international peer-reviewed journals and was recently identified as having the third highest ISI citation ranking of any institution in this field globally. UEA-CSERGE will contribute to Task 3.2 (Market and non-market valuation) by providing expertise on the valuation of non-market ecosystem service related goods.

Prof. Ian J. Bateman is the Director of CSERGE and Principal Investigator on over £15million of research to date. His expertise lies in the application of economic analysis to the assessment of Ecosystem services. He is the author of more than 125 papers in peer reviewed international journals (which have attracted over 8,000 citations to date), of more than 150 book chapters and over a dozen books. He has been involved in several EU funded projects, including AQUAMONEY, CLIME and EMERGE. He has received several awards, most recently the Royal Society Wolfson Research Merit Award; 2011 (5 year award), is a Member of the Science Advisory Council (SAC) for the UK Department for Environment, Food and Rural Affairs (Defra); and

Research Fellow at CIESM (The Commission Internationale pour l'Exploration Scientifique de la Mer Mediterraneè; The Mediterranean Science Commission), Monte Carlo, Monaco.

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Partner 26: ALU - Albert Ludwigs University Freiburg

Founded in 1457, the University of Freiburg is one of the oldest German universities and is now one of the nation's leading research and teaching institution with more than 21,000 students from over 100 nations matriculated in 160 degree programs at 11 faculties, supported and trained by more than 5,000 professors and lecturers and many other employees. Proud of its 550-year history in the center of Europe, the University of Freiburg is consciously aware of its intellectual roots in the occidental Christian tradition. Building on the original disciplines of theology, law, medicine, and philosophy, it is dedicated to defining and pioneering new research areas and promoting a strategic interweaving of the natural and social sciences with the humanities. The university's recent success in the "Excellence" competitions, 2007 for research and 2009 for instruction, testifies to its position as one of the leading universities of the 21st century. The foremost research fields of the Faculty of Forest and Environmental Sciences concern the interactions between environment and society, especially taking into account aspects of global change. Topics including "sustainable use of resources" and "forests and landscapes" are a central part of research interests. Natural sciences, social sciences, and technical competences serve as a foundation for a wide-ranged, interdisciplinary approach to research and education. As a result, scientific findings provide us with a deeper understanding and transfer into society and political consulting.

ALU will be responsible for the analysis of evidence-based ecosystem services within Task 2.1 (Meta-analysis) and contribute to Task 3.1 (Ecosystem function and quantification), Task 3.5 (Trade-offs and synergies between services and alternative perspectives) and Task 2.3 (Synthesis).

Carsten Dormann received his PhD in plant ecology at the University of Aberdeen, UK. His research centers on statistical approaches to unraveling drivers of biodiversity across spatial scales. He led a Helmholtz Research Group on Biotic Ecosystem Services with particular focus on pollination and biological control. Since 2011 he is Professor for Biometry and Environmental System Analysis at the University of Freiburg, Germany, where he continues to develop his interest in statistical validation of environmental models.

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Partner 27: UBO - Rheinische Friedrich-Wilhelms-Universitaet Bonn

The University of Bonn was founded almost 200 years ago and is considered to be one of Germany's and indeed Europe's most important institutes of higher education. As home of learning to over 29,000 students, it enjoys an outstanding reputation both at home and abroad. The university employs over 500 professors and over 3,500 other academic staff members. The institute for geodesy and geoinformation (IGG) belongs to the faculty of agriculture which aims at the establishment of nutritional concepts, the sustainable production of energy and the competing use of land as well as the impact of climate. The IGG aims at the monitoring, analysis, visualization and modelling of land use and resource use processes as well as the development of management programs to support sustainable resource use at different scales. The University of Bonn will be involved in the lead of Task 2.1 (Meta-analyisis), co-lead Task 4.1(Demand for ES/NC Instruments) and contribute to Task 3.5 (Trade-offs and synergies between services and alternative perspectives), WP5 (Resource hub), Task 4.3 (Decision Support Tools and Methods), Task 4.4 (Implementation and Uptake), Task 4.5 (Guidance on Choice and Application of Instruments) and Task 2.4 (Synthesis).

Sven Lautenbach, received his PhD in applied system science at the University of Osnabrück, Germany. He works on ecosystem services with a focus on integrated modelling and trade-off analysis as well as on decision support and land use optimization. He recently started the assistance professorship for landscape modeling and ecosystem services at the institute for geodesy and geoinformation.

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Partner 28: UoE - University of Exeter

The Land, Environment, Economic and Policy Institute (LEEP) at the University of Exeter (UoE) is one of the largest centres of environmental economic research in Europe and incorporates the majority of staff at The Centre for Social and Economic Research on the Global Environment (CSERGE). The UoE team has a track record in environmental economics stretching back to the 1980s and has undertaken for International bodies (OECD; EU; CEC); UK Government Departments (Defra; DfT; DoH); UK Official Agencies (NICE; EA; FC; OFWAT); US Agencies (US EPA, US NSF); Industry bodies and companies (UKWIR, multiple utilities); and various consultancy companies. The team has produced a large number of papers in international peerreviewed journals with one of the highest citation ranking of any group in this field globally. LEEP at UoE will contribute to Task 3.2 (Market and non-market valuation) by providing expertise on the valuation of non-market ecosystem service related goods.

Prof. Ian J. Bateman is the Director of LEEP and Principal Investigator on over £18million of research to date. His expertise lies in the application of economic analysis to the assessment of Ecosystem services. He is the author of more than 130 papers in peer reviewed international journals (which have attracted over 15,000 citations to date), more than 150 book chapters and over a dozen books. He has been involved in several EU funded projects, including AQUAMONEY, CLIME and EMERGE. He has received several awards, including an OBE for services to environmental science and policy and a Royal Society Wolfson Research Merit Award. He is a Member of the Natural Capital Committee of the UK Department for Environment, Food and Rural Affairs (Defra); the Joint Nature Conservation Committee and Research Fellow at CIESM (The Commission Internationale pour l'Exploration Scientifique de la Mer Mediterraneè; The Mediterranean Science Commission), Monte Carlo, Monaco.

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Partner 29: Oppla

Oppla is non-profit entity (SME) with a mission to "assist people in making nature work for the benefit of humankind". It achieves this by managing and developing the Oppla platform (www.oppla.eu): a web-based community and innovation hub for sharing knowledge about nature-based solutions, ecosystem services and natural capital. The organisation is based in The Netherlands and constituted as a European Economic Interest Grouping (EEIG) comprising two founding members: the European Centre for Nature Conservation (ECNC) and Countryscape. The concept, content and business model underpinning Oppla is the result of EU FP7 projects OPERAs and OpenNESS. Since its launch in September 2016, Oppla has generated a community of over 1000 members and 100+ partners, drawn from a wide range of sectors (representing science, policy, business and society). This includes a strategic relationship with the United Nations Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES).

Oppla provides a 'freemium' model for users, meaning that membership and access to services are free at point of use. Content is obtained and managed following the principles of crowd-sourcing and open data, creating unprecedented opportunities for co-design and innovation. Current services include a 'Knowledge Marketplace' – a searchable database of guidance, software, data and other resources; a community directory and expertise match-making facility; a crowd-sourced question and answer service (Ask Oppla); and a project archiving and legacy service, with numerous other facilities in the pipeline.

Rob Wolters, Executive Director ECNC and General Manager of Oppla. Rob has experience in a wide range of projects, including those related to stakeholder involvement, ecological networks, financing biodiversity and support to policy processes. He has extensive experience in dealing with complex international processes and with relevant intergovernmental biodiversity processes (CBD, EU, pan-European, national and regional). He was the first President of the Pan-European Biological and Landscape Diversity Strategy (PEBLDS). Rob is a skilled mediator, facilitator and negotiator, and has acted as chair at numerous meetings. He is the author of publications on European biodiversity policy, economy and ecology, and investing in sustainability and biodiversity.

Paul Mahony, Creative Director. Paul is a member of the Oppla Coordination Team (management board) and a senior partner of Countryscape. He has an extensive track record in communications and marketing, business development and knowledge exchange within both the public and private sectors, focusing on the environment. He has developed and managed communications strategies, information platforms and knowledge networks for organisations including the UK Department for Environment, Food & Rural Affairs (Defra), Natural England and the Centre for Ecology & Hydrology (CEH), amongst others. He has also led numerous

projects within the sustainable tourism sector, working with Scottish Natural Heritage, Cadw, National Trust and other major operators within the UK. Paul a member of CharityComms, through which he provides advice to non-profit organisations. He is also a non-executive director of Ketso, a social enterprise (established by the University of Manchester) that develops innovative tools for participatory planning and decision-making.

Dr Jemma Brookes, Landscape Planner & Oppla Administrator. Jemma specialises in new approaches to integrating nature-based solutions within landscape planning, focusing on environmental sustainability and its link with landscape and land use, including agriculture. She has a wealth of expertise in landscape character and condition assessments, impact assessments, sustainability appraisals, stakeholder engagement and scenario modelling. She is also skilled in the use of Geographical Information Systems (GIS). Jemma is a member of the Oppla administration team, managing knowledge exchange, networks and partner development.

Rose Galsworthy, Media Editor & Oppla Administrator. Rose is an experienced web and media editor with a range of experience in the environmental and public sectors. She has a BSc in Biology (University of Liverpool) and MA in Wildlife Documentary Production (University of Salford). She is a specialist in multimedia production and has developed film, animation and podcasts as engagement tools for organisations including The Natural History Museum, The Royal Television Society, The National Trust and others. Her portfolio includes the BBC David Attenborough series, 'Rise of the Animals'. Rose has also facilitated knowledge exchange in the public and private sectors, including within the UK National Health Service (NHS) and leading international tourism organisations, including Eurocamp. She is a member of the Oppla administration team, managing social media and online content development.

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B 2.3 Consortium as a whole

Consortium background

The composition of the consortium has been carefully constructed to ensure optimal balance and complementarity between partners in order to ensure the achievement of the project objectives. OPERAS research partners lead in European ES science, and are actively involved in international science networks. They look forward to close collaboration with SMEs to operationalize ES/NC science and systematically inform sustainable land, water and urban management. SMEs play an important role in the project, developing services and products derived from ecosystems. SMEs receive 24% of the project's resources, as illustrated in Figure 7, and lead Tasks 4.1, 4.2, 5.1 and

5.2. Table 2.3a provides an overview of how OPERAs will contribute to the SME's business strategies and contribute to innovation and competitiveness.



Figure 7. Distribution of resource between main categories of organisation

Table 2.3a Over	view of OPERAS	<i>S</i> contribution	to SMEs	

Part	tner	OPERAS contribution to SME business strategy	OPERAs contribution to innovation and competitiveness
7	Prospex	Further development of expertise in the area; cooperation with key players in the market; application of new services.	Contribution to the development of new or expanded innovative services in this domain.
8	WCMC	Enhancing the networks, knowledge and tools with which WCMC informs the international public and private sector decision-makers	Multi-scale, multi-sectoral development and testing of decision-making tools
10	IEEP	Increased knowledge on ES /NC links to ES/NC research community, supporting high-quality, state-of-art policy assessments and advice.	Increased capacity and knowledge base to support the development of more innovative policies and policy instruments.
18	SGM	Decision trees and operational strategies of ES/NC applied to coastal dune management.	Widening of the ICZM concept with a more dynamic and operational link between economy, societal issues and

			coastal defence.
20	ECM	Widening access to expertise to guide the development of web-based platforms.	Opportunities to apply and showcase the application of web-based platforms for sharing, interpreting and presenting spatial data.
21	Biotope	Operationalized tools and methods based on cutting-edge science and increased visibility from a high-profile ES/NC community	Innovation in ES/NC tools and methods, which will enhance competitiveness through improved decision support for our clients
22	IODINE	Access to new research collaborations in our core business area, ensuring decision support work informed by state of the art science.	Seeking to combine economic analysis, GIS and bioinformatics to develop web tools and software for biodiversity decision support.
23	Denkstatt	Through OPERAs we will: a) gain know-how; b) foster a market for new/upgraded services; c) gain a competitive advantage	OPERAs will upgrade sustainability applications and tools by making a scientific concept operational

Complementarity between partners

Table 2.3b summarises the complimentary nature of the research institutions participating in the consortium. They represent different regional backgrounds from north to south and east to west, have complementary disciplinary and interdisciplinary expertise, and all have extensive experience in ES/NC science, policy or practice. All have collaborated successfully with several of the other organisations in previous European projects in different combinations over the last decades. The participation of the SME Prospex is important because of their experienced and innovative facilitation of stakeholder engagement workshops.

Par	tner	Added value to OPERAs	Motivation for participation			
1	UEDIN	Expertise foresight, stakeholder engagement, and ecosystem service assessments across scales.	Strong interest in working with SMEs to operationalise ES/NC concepts and develop new methodologies for ES/NC assessment			
2	VU-IVM	Expertise in interdisciplinary analysis methods and the transfer of scientific knowledge to practice and policy. Hosts leading expertise on both the ecological and monetary aspects of ES/NC.	Conduct cutting-edge research in partnership with SMEs to operationalise knowledge in practice			
3	KIT	Quantification of multiple biophysical ecosystem functioning and ES in a	Explore linkages of ES to economic valuation, assessment of trade-offs and			

Table 2.3b.	Specific	expertise	of OPERAs	partners
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		changing environment; local, regional to global scale	uncertainty
4	UFZ	Expertise and tools (blueprint) for meta-analysis of ES case studies, trade- off analysis, ES assessments	Evaluation of instruments and methods through a greater variety of case studies and applications within synthesis
5	ULUND	Host of the largest social science network on global environmental change (ESG); unique expertise on climate change and wine industry.	Unique opportunity to link politics and ecosystem research.
6	EFI	Leading European Forest research network with interdisciplinary competence at the science policy/practice interface	Cross-sectoral interaction with high- profile ecosystem service community, improving strategic decision support instruments.
7	Prospex	Provision of top-class professional facilitation and stakeholder engagement services. In-depth experience with top-level international research projects.	Operationalisation of ES/NC approach as key step for stakeholders; opportunity for partnerships with leading institutions in research and application.
8	WCMC	Respected knowledge broker at the heart of international biodiversity and ecosystem service science-policy networks	Engage with leading European scientists and institutions to strengthen knowledge base and applied tools for decision-makers
9	Tiamasg	Software solutions in developing the information portal (Resource Hub) and ES/NC instruments	Embedding the existing knowledge from ES/NC in software instruments for broader dissemination and better understanding
10	IEEP	Policy analysis & science-policy interphase, integration of ES/NC into decision-making; regional, national, EU & international level	Development of tools that integrate ES/NC into decision-making, thus supporting sustainable use of biodiversity and ecosystems.
11	UCD	Considerable experience in research in land use planning at the social- ecological interface and in socio- cultural / socio-economic policy formation.	Desire to explore socio-cultural values in ES/NC, hitherto un-described, and a desire to develop partnerships in the exploration of this area of research,
12	CNRS	Expertise on the incorporation of biodiversity effects into the modelling of ES/NC, and on the analysis of ecological mechanisms underlying ES trade-offs	Transfer from theoretical approaches of ES/NC modelling to the development of stakeholder and policy relevant instruments. Interaction with high-profile ES community.
13	UP	Expertise on climate impact research with long-term expertise in policy- relevant science of human-environment	Promotion of the ES/NC concept for decision-making, and of techniques for better integration of socio-economic

		systems	and ecosystem perspectives
14	ETH	Expertise in the development of innovative decision-support tools embedded in the analysis of political processes.	Operationalisation of the ES/NC concept in collaborative platforms in different political contexts addressing risk and uncertainties.
15	WWF Bulgaria	Leading conservation organisation at European and national level, with strong policy expertise and experience in developing PES	Participate in the development and testing of innovative scientifically- based mechanisms for the protection of the Danube River ecosystems
16	WWF Romania	Leading conservation organisation at European and national level, with strong policy expertise and experience in developing PES	Participate in the development and testing of innovative scientifically- based mechanisms for the protection of the Danube River ecosystems
17	SGM	Expertise in applied science in urban planning and environmental assessment of public works. Efficient links with local stakeholders.	Introduce the operational aspects of ES/NC into Integrated Coastal Zone Management (ICZM).
18	FFCUL	Expertise in ecosystem functioning, biodiversity and ES in a human-shaped cultural landscape ('Montado'), including the interface with local stakeholders.	Explore linkages of ES/NC to economic valuation and testing of tools that integrate ES/NC into decision- making, thus supporting sustainable use of biodiversity and ecosystems
19	ECM	Developer of innovative cutting edge software as a service and application expertise to clarify environmental issues such as ES/NC.	Would like to apply our software solutions to the challenge of operationalising the concept of ES/NC.
20	Biotope	Expertise in assessing ES/NC under time, budget and data constraints, and experience of end-user needs and expectations.	Going beyond state of the art in advising decision-makers, and building a high-profile ES/NC community in Europe
21	IODINE	Expertise in decision support, environmental valuation. Tinch co- leading SPIRAL 'instruments' WP, BESAFE 'synthesis' WP.	Extend collaboration to develop enhanced integration of economics and ecosystem services for practical decision support.
22	Denkstatt	Denkstatt is a prime sustainability consultancy in South Eastern Europe – specialized in EMS, LCA, CSR reporting, stakeholder engagement	We wish to increase our competence and participate in the latest know-how developments in the sustainability sector
22	CIFOR	Leading global research institution on tropical forests	Contribution to CIFOR's mandate of addressing global issues and engaging in international and national forums to

			illuminate these issues
24	CSIC	Expertise in marine ecology, conservation and biogeochemical cycles, conservation at the Mediterranean, European and global scales.	Wish to develop its capacity in coastal ecology within the framework of ES and the interaction between ecological and social systems
25	UEA	UEA contributes expertise in the economic valuation of ecosystem service related goods	Extend collaboration to develop enhanced integration of economics and ES for practical decision support
26	ALU	Expertise in meta-analysis of ES case studies, trade-off analysis, ES assessments	Evaluation of instruments and methods through a greater variety of case studies and applications within synthesis
27	UBO	Expertise and tools (blueprint) for meta-analysis of ES case studies, trade- off analysis, ES assessments	Evaluation of instruments and methods through a greater variety of case studies and applications within synthesis

2.3.1 Third Parties

Parts of the tasks of Partner 6 European Forest Institute (EFI) are carried out by staff from Universität für Bodenkultur (BOKU). Through the agreement between EFI and BOKU, the BOKU staff follow instructions concerning work under the OPERAs project as given by EFI and report on work done under the OPERAs project to EFI, the results of their work belong to EFI, they report for time to EFI, and they are allowed to telework. EFI will reimburse BOKU for the direct costs for the staff working on OPERAs and EFI will be the contact person to the EC taking care of financial and narrative reporting towards the EC. The contributions made available to EFI as the beneficiary will be charged in the form C of the beneficiary EFI, under EFI's direct costs. The EFI contact person is Diana Tuomasjukka.

BOKU will be active in WP 4, in tasks 4.1 Demand for ES/NC instruments, 4.2 ES/NC information tools, 4.3 ES/NC Decision Support Tools, and 4.4 Implementation and uptake of ES/NC concepts. The estimated budget for BOKU is up to 140000 EUR for personnel costs.

B 2.4 Resources to be committed

OPERAS will advance understanding and develop new instruments to operationalise the ES/NC concepts, which will be communicated to ecosystem practitioners through the resource hub and associated CoE. This will be achieved through the mobilisation and integration of 27 main partners with a large number of stakeholders throughout Europe who are working in relevant policy areas and in a variety of appropriate sectors and activities. In addition to the direct grant to the project provided by the Commission, OPERAS mobilises a critical mass of resources through its close cooperation with existing major national and international research programmes and projects (see section B3.1). The effective integration with key components of this project, and resultant economies of effort and scale, ensures that the effective value to European science and society may be estimated at many times the requested grant to the OPERAS budget.

The resources detailed in this section represent the minimum critical mass necessary in order to achieve the proposed goals of the project. The majority of resources are being used to employ personnel directly on the project. The total project budget is $\notin 11,459,749$, with a requested EC contribution of $\notin 8,997,909.50$ (Table 2.4a) over a total project length of 60 months. The complex

nature of the project and the ambitious scope requires sufficient resources to meet the high scientific standards and at the same time ensure adequate participation by stakeholders. All partners will contribute to the project with additional institutional resources such as technical facilities, models and databases, etc. Several partners also expect to be able to arrange for productive collaborations with other projects that may allow for additional benefits for the OPERAs project, especially by further broadening and deepening stakeholder and user participation at crucial stages. In addition to the breakdown of the efforts in person months over work packages (see Table 1.3a), Table 2.4b summarises the total resources required for a successful implementation of the project. In terms of person months, 87% of the effort will be allocated to RTD, 7% to management and 6% to outreach, dissemination and training.

A significant pool of resources has also been set-aside for organising workshops and funding the travel and subsistence expenses of external experts from European and regional stakeholder communities (Table 2.2c). Resources for travel for the main partners cover the General Assembly meetings, the PMT, relevant project workshops, plus any additional *ad-hoc* work package meetings. Travel and other general consumables were calculated using a fixed algorithm of $300 \in$ per person month. This minimum critical mass of resources for workshops and travel is essential to achieve the integration required to deliver an innovative CP and build the CoE.

Resources are distributed evenly over the main RTD WPs (WP2 Practice, WP3 Knowledge and WP4 Instruments), with a smaller contribution for WP5 Resource Hub and WP6 Outreach (Figure 8). Figure 9 illustrates how RTD person months are distributed over the partners. Partners with a smaller number of person months generally focus on one of the WP2 Exemplars, while the largest number of person months is attributed to WP leaders. The extra effort needed for project management, as well as direct costs associated with the summer school and workshop organisation result in a higher total budget for the Coordinator UEDIN, as reflected in Table 2.4a.

Table 2.4a Breakdown of total resources requested for 60 months (in $k \in$)

Parti	cipant no.	РМ	Staff	Subcon tract	T&S	Consu mables	Other	Indirect	Total	EC contribu tion
1	UEDIN (coordinator)	130	891	102	27	13	218	485	1698	1484
2	VU-IVM	87	685	8	17	9	16	437	1172	894
3	KIT	57	346	3	11	6	3	285	655	503
4	UFZ	18	95	0	24	6	0	72	197	147
5	ULUND	67	456	4	12	6	47	301	808	630
6	EFI	62	403	4	12	6	3	391	820	629
(6)	(BOKU)	(21)	(140)	(0)		(0)	(0)	(0)	(140)	(140)
7	Prospex	20	188	3	4	2	151	207	555	417
8	WCMC	41	326	90	10	5	88	248	753	646
9	Tiamasg	53	216	0	10	5	2	140	373	277
10	IEEP	48	301	3	10	5	4	307	628	471
11	UCD	39	211	0	8	4	14	142	378	284
12	CNRS	75	359	3	15	8	30	246	660	515
13	UP	51	249	0	11	6	13	167	447	336
14	ETH	52	228	0	11	6	20	149	396	307
15	WWF Bulgaria	44	67	8	9	4	13	18	118	76
16	WWF Romania	8	17	0	2	1	11	6	36	30
17	SGM	12	55	0	2	1	13	43	115	86
18	FFCUL	12	39	11	2	1	11	32	96	72
19	ECM	13	77	0	3	1	1	49	131	98
20	Biotope	29	157	0	6	3	1	33	201	150
21	IODINE	10	73	0	2	1	1	46	122	92
22	Denkstatt	29	75	0	6	3	1	30	116	87
23	CIFOR	15	80	0	3	2	18	22	125	94
24	CSIC	19	85	0	4	2	23	100	214	160
25	UEA	7.5	41	0	1	0	2	26	68	51
26	ALU	23	117	0	10	5	0	79	211	158
27	UBO	23	117	0	10	5	0	79	211	158

Collaborative Project

28	UNEXE	4.5	34	0	0	0	2	22	58	44
29	OPPLA	12	75	0	0	0	7	16	100	100
	Total	1062	6073	237	243	1117	698	4216	11459.7	8997.9

Table 2.4b. Overview of costs to be committed

	RTD	Management	Other	Total
personnel months	930	65	67	1062
proportion	87%	7%	6%	100%
personnel costs (k€)	5271	444	331	6063
Subcontracting (k€)	19	31	187	237
other direct costs (k€)	682	24	319	977
indirect costs (k€)	3695	270	273	4180
Total (k€)	9667	769	1024	11459.7
proportion	84%	7%	9%	100%
Requested EC Contribution (k€)	7150	769	1024	8997.9



Figure 8. Distribution of Person months between the OPERAS WPs.



Figure 9. Distribution of resources over OPERAs partners

Participant WP		WP	Costs	Justification
		WP6	25	Subcontracting professional branding: logo, website design and brochures
		WP6	15	Subcontracting popular science writing for Resource Hub and Policy Briefs
1	UEDIN (coordinator)	WP6	60	Subcontracting short promotional films at the beginning and end of the project for inclusion on the website
15	WWF Bulgaria	WP2	7.5	Subcontracting ecological field work and data collection in the lower Danube Exemplar
18	FFCUL	WP2	11	Subcontracting regional facilitation for workshops in the local language (Portuguese)
	WCMC	WP5	87	Subcontracting the Resource Hub (Oppla) development

Table 2.4c. Justification of major subcontracting costs ($k \in$)

The project has a significant budget for subcontracting and other direct costs, which relate to stakeholder engagement in the Exemplars, in the development of the CP and in dissemination and training activities (WP6 Outreach). Stakeholder workshops require a sizeable budget to cover venue hire and travel costs of participants. Many OPERAs activities will rely on operationalizing exiting data and information, but in some exemplars additional data will need to be collected. In addition, there is significant budget for outreach activities, which include the development of promotional and instructional films, professional branding, and the organisation of a summer school, a conference and the development of the Resource Hub (Oppla). Table 2.4C provides a full a justification of the major subcontracting costs. In addition, a total of \notin 31.4k has been included across the partners for auditing costs (WP1 Management). Hence the total subcontracting costs are \notin 237.3k. Any subcontract, the costs of which are to be claimed as an eligible cost, will be awarded to the bid offering best value for money (best price-quality ratio), under conditions of transparency and equal treatment.

Participant		WP	Costs	Justification
		WP2	12	Organisation of stakeholder workshops to test instruments
		WP6	60	Summer school organisation
		WP6	20	Open source Scientific publications
		WP6	40	Promotional material (including early stage films)
		W6	20	Other printing costs
1	UEDIN (coordinator)	WP6	20	Travel costs for the Advisory Council
2	VU-IVM	WP2	12	Setting up European social evaluation crowd sourcing
5	ULUND	WP2	25	Travel and workshop organisation for workshops to test instruments

Table 2.4d. Justification of other major direct costs ($k \in$)

7	Prospex	WP5	150	Organisation of 4 User Board workshops, 2 European stakeholder workshops, incl. venue hire and stakeholder Travel & Subsistence)				
		WP6	75	Training workshop organisation and (venue, Travel & Subsistence of stakeholders)				
8	WCMC	WP6	50	Organisation of OPERAs conference (venue, speakers, promotion)				
11	UCD	WP2	12	Organisation of stakeholder workshops to test instruments				
12	CNRS	WP2	24	Organisation of stakeholder workshops to test instruments				
13	UP	WP2	10	Organisation of stakeholder workshops to test instruments				
15	WWF Bulgaria	WP6 Figure 510.		PozenketiqhefOPERiAts fratemenslistfllobexemplars				
16	WWF Romania	WP6 ^a	ble to ach	Organisation of field visits for journalists to Exemplars				
17	SGM	WP2	12	Organisation of stakeholder workshops to test instruments				
18	FFCUL	WP2	10	Organisation of stakeholder workshops to test instruments				
		WP2	12	Organisation of stakeholder workshops to test instruments				
24	CSIC	WP2	10	Ecological sea grass measurement to support Exemplar				

B3. IMPACT

B 3.1 Strategic impact

Expected impacts listed in the work programme

Call ENV.2012.6.2-1 states that the expected impacts will be an 'Improved understanding of how

ecosystem services and natural capital contribute to human well-being across scales locales. sectors. and time. Contribution to more sustainable ecosystem management maintaining and enhancing a sustainable flow of a broad range of services from ecosystems while preserving their ecological value and biological diversity. Contribution to more effective and inclusive management of ecosystem services balancing trade-offs in social and individual well-being. Increased EU competitiveness by innovative processes and services derived from operationalising the concept of ecosystem services and natural capital.' To achieve these impacts, the OPERAs impact strategy includes a portfolio of activities that fit within the overall project design. The project specifically puts 'Practice' central to these activities in which knowledge is



operationalised and innovative processes and services will be designed as joint-ventures between research institutes and SMEs.

OPERAs impact strategy

OPERAs will maximise the impact of the research outcomes during and after the project lifetime by an agreed 'pathways to impact' plan prepared at the start of the project in close consultation with stakeholders. The consortium has been tailored so that the different partners complement one another in terms of targeting optimal impact (Figure 10). OPERAS, intentionally, does not represent a single knowledge network or research community, but includes representatives of all the major global and EU networks in the field of ES/NC. This configuration brings together the expertise of different networks and collaborations, thereby enhancing innovative capacity. At the same time, the engagement of partners in different networks facilitates the pathways to dissemination. OPERAS will have policy impacts through the application of knowledge and the uptake of tools, which will enhance social and individual well-being through improved management of ES/NC and contributions of NC to the green economy. OPERAs will have economic and societal impacts by increasing the effectiveness of ecosystem management, and will demonstrate advances in science and research impacts, across and within disciplines, including significant advances in ES/NC understanding, methods, theory and application. Tables 3.1a to 3.1d give examples of OPERAS' specific, measurable impacts across the domains of policy, economy and society, and science and research. Through this approach, OPERAs will fully address call ENV.2012.6.2-1 by directly supporting the key target of the Environment Theme 6.2 - Sustainable use and management of land and seas.

Policy impacts

Europe's 2020 Strategy aims to transform the EU into a knowledge-based, resource efficient and low-carbon economy. It seeks to mainstream and reinforce the role of sustainability in policy development by establishing the priorities of smart, sustainable and inclusive growth within the overall aim of establishing a Green Economy that is characterised by high resource efficiency, decoupling of natural resource use from economic growth, improving human well-being and preserving natural capital (Com(2011)363). OPERAs will support Europe's progress towards a Green Economy by improving understanding of how ES/NC contributes to human well-being across locales, sectors, scales and time (WP3 Knowledge) enabling more sustainable ES/NC management with innovative processes and instruments (WP4 Instruments) that are tailored and tested for the demands of end users (WP2 Practice) and promoted for broad uptake (WP6 Outreach). Improved accounting for trade-offs will reduce conflicts between different policies and provide insight into power asymmetries and conflicting interests through enhanced mapping of the beneficiaries of ES. OPERAs can have a huge impact in this area because it will increase understanding of the ES/NC concept on: a) the perception of policy makers and stakeholders (who), b) the policy implementation phase (when), and c) communication and participation (how). These factors constitute the three cornerstones in operationalising the ES/NC concepts successfully and in demonstrating this to policy makers, as well as providing them with guidance on the use and effectiveness of the concepts in specific situations. Specifically, OPERAs will:

- Develop outreach activities through the project Advisory Council and User Board, as well as engaging with Exemplar-specific stakeholders. Regular meetings, participation in project events and ad-hoc workshops will be used to implement these activities.
- Develop information tools that will support the CoE, involving policy stakeholders in order to embed the ES/NC concepts in new policy thinking. The Resource Hub, policy briefs and short films with best practice examples will be used to implement these activities.

• Influence global and environmental governance processes by engaging in international sciencepolicy initiatives, e.g. IPCC, ipBES and ThinkForest. In many of these initiatives OPERAs partners already play a key role, which will facilitate engagement with the project.

Table 3.1a.	Measurable	impacts	across	end-users,	impact	indicators	and	OPERAs	activities	for
policy										

Impacts	Impact indicator	OPERAs activity to achieve impact			
[and end users]					
Policy					
-Embedding ES/NC into operational policy and the design of EU directives [EU policy makers] -Using ES/NC to avoid conflicting policies and unintended trade-offs [national policymakers; NGOs and lobby groups]	 Engagement of EU and national-level decision makers, NGOs and lobbyists in the stakeholder process Input from decision makers in testing new decision support tools and instrument evaluations Representation of policy and decision makers in the OPERAs advisory 	 -Stakeholder interaction through workshops and personal contact -An exemplar study targeted at the operational potential of ES/NC for EU directive design and implementation -Full accounting of relevant directives (water, flood, biodiversity, soil) in all exemplar studies -Decision support and information elicitation tools for ex-ante evaluation of policies from an ES/NC perspective 			
	committee				
-Engagement in global and regional environmental governance processes [global policy and decision makers; NGOs and lobby groups]	-Consortium involvement in major global and regional science-policy fora -Input to global conventions such as the CBD; Ramsar, UNFCCC, UNCCD -Formation of an international 'Advisory	 -OPERAs partners engage in international science-policy platforms, <i>viz.</i> ipBES (Cramer, Walpole, Gupta) and IPCC (Rounsevell, Olsson, Cramer, Berkhout), ThinkForest (EFI) -Frequent press releases -Short films with best-practice examples to stimulate science-policy debates on ES governance, displayed in green week. 			
	Council' including members from global organisations such as FAO, IUCN, UNEP, UNDP, World Bank	 Dissemination of policy briefs Targeted exemplar study at the global scale to study policy instruments and mechanisms 			

More specifically, OPERAS will build on, connect and inform specific European policy initiatives, frameworks and directives, including the European Ecosystem Assessment co-ordinated by the EC and the Land Use and Ecosystem Accounting (LEAC) conducted by the European Environmental
Agency. It will contribute to national ecosystem accounting initiatives (NEA, national and EU level TEEB) while policy areas where particular benefits can be expected include:

- Common Agricultural Policy (CAP) and the move to public payments for public goods (high nature value (HNV) farming, agri-environmental schemes, less-favoured area compensations and beyond) as a mechanism to encourage conservation and provision of services. In policy reform and instrument design, critical targeting of biodiversity conservation measures is needed, exploiting synergies between agricultural production, biodiversity and ES while avoiding negative trade-offs. Effective policy integration is required. The project will build on the results of the FP7 RUFUS project that identified policy integration issues across sectors and scales in Europe.
- Common Fisheries Policy (CFP). This will benefit from improved understanding of the relationship between biodiversity components, diversity and quantity issues and maximum sustainable yield indicators. In particular, the coastal/marine exemplars will have major relevance here.
- Water Framework Directive (WFD) implementation. The greater appreciation of the value of the ecosystem services related to water, and the synergies with other policy directives will help offer greater motivation for the implementation of the WFD, and monitoring of the quality status of water. Almost all exemplars will address issues related to the WFD, while specific attention to these issues will be given in the transboundary Danube exemplar.
- REDD+ (Reduced emissions from deforestation and degradation). The new instruments being supported by the UNFCCC and the UN CBD, and the associated proposals for a biodiversity premium, stand to benefit significantly (in their design, targeting and implementation) from an improved understanding of the relationship between biodiversity, services and valuation. By focusing on carbon sequestration, REDD+ risks missing opportunities to achieve synergies with biodiversity conservation and un-intended impacts due to leakage and spatial/temporal lag effects, leading to inefficient policy implementation. The global exemplar will focus on these issues, especially trade-offs in developing countries. International partner CIFOR will play a major role in this analysis.
- The Habitats Directive (together with the Birds Directive) forms the cornerstone of Europe's nature conservation policy, and is built around the Natura 2000 network of protected sites and the strict system of species protection. Natura 2000 designation, management, investments and financing will benefit from improved understanding of the relationships between biodiversity, ES and values.
- Green infrastructure. The European Commission is developing a strategy for an EU-wide Green Infrastructure as part of its post-2010 biodiversity policy. The concept is central to the overall objective of ecosystem restoration, and part of the 2020 biodiversity target. OPERAs research and tools will contribute significantly to the design and efficient implementation of the green infrastructure target, being addressed explicitly in the EU, Scottish and Danube exemplars.
- Climate change adaptation (including the Adaptation Policy White Paper and the Floods directive). Climate services are part of ecosystem services, and adaptation to climate change is most effective in synergy with other objectives. To address this efficiently, collaboration will be sought with the winning consortium of call ENV 2012.6.1-3: Strategies, costs and impacts of adaptation to climate.

Economic and societal impacts

OPERAS will facilitate and stimulate more effective ES/NC management across socio-ecological systems and support the development of innovative products based on ES. Making better use of NC has the potential for cost savings compared to 'traditional' technological solutions. To achieve this,

OPERAS will establish a CoE for continued practice. The CoE will, amongst other things, act as a think tank and sounding board during and after the project's lifetime, bringing together experts from relevant disciplines alongside users from different sectors to provide a forum for foresight and strategic discussion. It will coalesce around a digital platform for high-level professional exchange and knowledge sharing with full access to the OPERAS CP, relevant databases, scientific references and other sources of information. Specifically, OPERAS will:

- Mainstream the ES/NC approach by developing on-line training courses for practitioners, disseminating best practice through the Exemplars and journalist excursions, and by creating a business plan to market and exploit the innovative products arising from the project.
- Create new and improved tools to operationalise ES/NC in a range of decision-making contexts.
- Contribute to key new ES/NC initiatives and knowledge networks, including amongst others the EC-funded, Millennium Assessment-inspired Sub-Global Assessment Network (SGAn), the TEEB-inspired Ecosystem Services Partnership (ESP) and the UK government (DEFRA) Ecosystem Knowledge Network.
- Engage with the general public within Europe through crowd-sourcing techniques and the use of consumer choice labelling

Impacts	Impact indicator	OPERAs activity to achieve impact
[and end users]		
Economy and society		
-Mainstreaming the ES/NC approach in society, business and governance [general public; SMEs, NGOs, business; decision makers]	 Resource Hub with internet portal and clearinghouse embedded in a global network/institution Best-practice guidelines for science, policy, business and consumers (linked to the TEEB initiative (ten Brink, Wittmer, Brouwer) and national initiatives (NEA; Bateman) 	 Providing open-access to the knowledge- base, databases and instruments for implementing the ES/NC approach by the CoE On-line training courses for practitioners and knowledge brokers in using the CP Dissemination of best-practice examples through journalist excursions in the exemplars Business plans to market and exploit
	-Stakeholder engagement in exemplars	innovative products
-Contribute to well- being and a sustainable and resource-efficient economy by enhancing the sustainable flow of ES	-Popular use of a specially developed ES/NC 'app', creating awareness of ES trade-offs in consumer choices	 -Information elicitation methods for citizen engagement (Web 2.0); embedding ES/NC in consumer choices (labelling) - Accounting for power asymmetries and equity issues for ES/NC management
from ecosystems while preserving their ecological value and biological diversity [general public]	 OPERAs social media initiatives (collaborating with existing networks) 	- Meta-analysis to explore on-going cases in the UK-DFID/NERC ESPA initiative (Ecosystem Services for Poverty Alleviation) and projects by Conservation International

Table 3.1b. Measurable impacts across end-users, impact indicators and OPERAS activities for the economy and society

Science and research impacts

The OPERAs partnership brings together leading academics in the ES/NC natural, social and economic sciences. These individuals provide impact through their involvement in national, European and global research networks, participation in international conferences, and shaping recent global initiatives such as ipBES. A feature of the OPERAs consortium is that its composition represents a mix of partners from different established networks. Many of the OPERAs impacts can be realized by promoting the use of results and knowledge from projects carried out by the project participants and their networks, leading to wider dissemination across a range of customers, stakeholders, research and social partners. Specifically, OPERAs will:

- Engage and take academic leadership in a range of international science initiatives, including, but not limited to GLP, DIVERITAS, ILEAPS, AIMES, ESP, GEO BON, ECI, Alter-Net, ESG and LTER (see list of networks below).
- Build on and advance existing research networks through the CoE and the Resource Hub
- Organise a trans-disciplinary summer school for early-career stage academics, using the AVEC/Alter-net model initiated by one of the OPERAs partners. The summer school will be instrumental in training the next generation of ES/NC researchers and will involve up to 30 participants over a 10-day period.

Table 3.1c. Measurable impacts across end-users, impact indicators and OPERAS activities for science and research

Impacts	Impact indicator	OPERAs activity to achieve impact
[and end users]		
Science and research		
-Contribute to existing major global and European science networks in environmental change and ecosystem services [represented in the evolving ICSU networks such as the core projects of IHDP, IGBP, DIVERSITAS and GEO BON; other relevant science networks, i.e. the Ecosystem Service Partnership (ESP), Alter-Net, LTER and ECI]	 -Endorsement of OPERAS by the Global Land Project -A cross-project conference and several workshops co- organised with the IHDP and IGBP projects -Peer-reviewed papers addressing the GLP, ESG, iLEAPS and AIMES research questions -Engagement of the global science community through inputs to the meta-analysis, exemplar studies, CP and CoE. 	 -Engagement of OPERAS partners in international science networks: DIVERSITAS (Cramer, Walpole), GLP (Verburg, Rounsevell); ESG (Olsson); iLEAPS and AIMES (Arneth), GEO BON (Metzger, Walpole, Cramer), ESP (Verburg, Seppelt), Alter-Net (CNRS, UFZ, PIK, CSIS), LTER (ULisbon), ELI (Seppelt, Verburg) -Organising a cross-project conference bringing different networks together - Linking the resource hub to existing databases, e.g. the ESP contribution to the IUCN databases -Building a CoE by disseminating results through mailing lists and social media that engage a broad science community
-Publish high-impact science results [the global science community with spin- offs for the general public and science- policy initiatives]	 -at least 3 publications in Science, Nature or PNAS -a continuous stream of publications to important (open-access) ISI journals -Publications in journals aimed at the science-practice interface such as 'Solutions' 	 Targeting research efforts on key, high impact science questions for ES/NC, e.g. the determination of critical thresholds and tipping points in ES provision Summer school for young ES scientists (Cramer, building on AVEC/Alter-net) Publications on learning-experiences in translating science to practice

Why this topic requires a European Approach

A European approach to this call topic is essential, since the ES/NC concepts relate strongly to EU level policy objectives and directives as outlined above. Operationalising the ES/NC concepts requires addressing cross-scale dynamics between local conditions and stakeholders, and embedding these in regional, national, EU and global institutional structures and governance systems. The exemplars have been chosen to cover a wide range of locales, biomes and geographic scales, where each exemplar will consider explicitly the implications at other scales. In order to produce credible outcomes that are transferable to other regions, a wide geographic distribution of exemplars is required. All EU member states are addressed in the exemplars, and stakeholders representing the different levels of governance and the different institutional structures are involved in either the advisory council, the user board or as stakeholders in the exemplar studies.

OPERAs connects to the FP7 Environment Theme through its objectives of (European Commission C(2011)5068 of 19 July 2011):

"Promoting sustainable management of the natural and human environment and its resources by advancing our knowledge on the interactions between the biosphere, ecosystems and human activities, and developing new technologies, tools and services, in order to address in an integrated way global environmental issues."

OPERAs will advance knowledge on the interactions between ecosystems and human activities (WP2 Practice and WP3 Knowledge) as well as develop new tools (WP4 Instruments) and services (WP5 Resource Hub). The sustainable management of ecosystems and natural capital will be promoted through the Community of Excellence and various outreach and dissemination activities (WP6 Outreach).

"Emphasis will be put on prediction of climate, ecological, earth and ocean system changes, on tools and on technologies for monitoring, prevention and mitigation of environmental pressures and risks including on health and for the sustainability of the natural and man-made environment."

OPERAs will predict changes in ecological systems with respect to ES/NC (WP2 Practice and WP3 Knowledge), develop tools for the prevention and mitigation of environmental pressures (WP4 Instruments and WP5 Resource Hub) and in so doing contribute to the sustainability of socio-ecological systems.

Relation to other research activities with specific attention to other EU FP projects

OPERAS will take stock of prior research activities, and European projects in particular. Projects in the fields of biodiversity and ecosystem services and policy design will be accounted for. Table 3.1d lists a selection of relevant projects that are currently running or recently completed and in which OPERAS partners are involved. Collaboration will be sought with these projects to explore methodological complementarities and research findings. Organization of joint workshops/meetings and publications/special issues will be considered through contact between the project leaders.

Table 3.1d Relevant EU funded research projects and networks

Project (funder)	Relevance to OPERAs	OPERAS
		partners
VOLANTE - Visions of Land Use Transitions in Europe (FP7)	VOLANTE provides novel visions for future land use in Europe based on modelling and stakeholder interaction. OPERAS will use the visions in the analysis of alternative ES/NS approaches and the methods for ecosystem service quantification.	UEDIN, VU- IVM, EFI, CNRS, PROSPEX
POLICYMIX (FP7) - Assessment of economic instruments to enhance the conservation and sustainable use of biodiversity	POLICYMIX is evaluating economic instruments and their impacts on biodiversity conservation and ES provision. While OPERAs focuses on novel ways to operationalise the ES/NS concepts, POLICYMIX provides in-depth knowledge about economic instruments and their implementation within a policy context, informing WP3 (Task 3.3) and WP4 (Task 4.5).	VU-IVM, UFZ
NEWFOREX (FP7) – New ways to value and market forest externalities	NEWFOREX is developing a set of values and provision costs for different environmental services. NEWFOREX valuation methods and case study results will be accounted for in the OPERAs meta-analysis and WP7 respectively	EFI
SCALES (FP7) - Securing the Conservation of biodiversity across administrative levels and spatial, temporal, and ecological scales	SCALES aims to better integrate ecological scale into policy and decision-making and biodiversity management. SCALES will provide assessment tools and policy instruments to foster our capacity for biodiversity conservation across spatial and temporal scales. OPERAS will use the SCALES findings by accounting for scaling in the NS/ES concept.	IEEP, UFZ
EBONE (FP7) – European Biodiversity Observation Network	EBONE is creating a data collection system for biodiversity and biodiversity indicators. OPERAS will use EBONE (and its GEO BON successor) to establish joint indicator protocols and to add ES/functional trait information to biodiversity data using EBONE data structures.	UFZ, UEDIN
CLIMSAVE (FP7) – Climate Change integrated assessment methodology for cross- sectoral adaptation and vulnerability in Europe	CLIMSAVE is development an Integrated Assessment Platform for climate change impact, adaptation and vulnerability assessment, which is of value to the OPERAs Knowledge research	UEDIN, Prospex
CLAIM (FP7)	CLAIM addresses the value of landscape in Europe and the ways in which mechanisms and policies can contribute to the valorisation of the (cultural) ecosystem	VU-IVM

Project (funder)	Relevance to OPERAS	OPERAs partners
	services provided by European agricultural landscapes	
TURAS (FP7)	TURAS brings urban communities and businesses together with local authorities and researchers to collaborate on practical solutions for more sustainable and resilient European cities. Collaboration with TURAS will contribute to operationalising the ES/NC concept in urban environments	UCD, VU- IVM
CONNECT (ERA- NET)	CONNECT links biodiversity to the notion of ecosystem services and their value. The conceptual advances of CONNECT will be input to WP2 of OPERAS	CNRS, UFZ, VU-IVM
UK National Ecosystem Assessment	The UK National Ecosystem Assessment (UK NEA) is one of the most advanced assessments of the applicability of the ES/NC concept at the national level. OPERAs will build on the experiences of this assessment (and its follow-up) to fill knowledge gaps, disseminate findings and embed the approach across multiple sectors and scales in the UK.	WCMC, UEA
TEEB – Economics of Ecosystem Services (UNEP and associated EU and national initiatives)	TEEB has set guidelines for the economic dimensions of operationalizing the ES/NC concepts. OPERAS partners play key roles in both the international TEEB study and in several national assessments. VU-IVM is the contractor of the DG ENV TEEB follow-up study for Europe: A synthesis of approaches to assess and value ES in the EU.	IEEP, VU- IVM, UFZ
Network	Relevance to OPERAS	OPERAs partners
ESP: Ecosystem Service Partnership	International network to enhance science and applications in the field of ES. OPERAs will collaborate with ESP on the enhancement of the ES valuation databases and use the case studies collected in ESP for the meta-analysis. OPERAs aims to organize joint workshops/conferences with ESP.	PIK, UEA, UFZ, VU- IVM
GLP: Global Land Project	GLP is a joint core project of the IHDP and IGBP. It represents the largest research community in land science with interactions between land management and ES provision as a core theme. OPERAS will use the GLP dissemination channels and collect international exemplars through the GLP network	VU-IVM, CNRS, UEDIN
ESG: Earth System Governance	ESG is a core project of the IHDP and brings together world leading expertise in environmental governance. OPERAs will build on the available expertise and organize a joint ESG/OPERAs workshop on Ecosystem	ULUND, VU- IVM

Project (funder)	Relevance to OPERAS	OPERAs partners
	Service Governance	
ALTER-Net	ALTER-net is a network of 27 European institutes that aims to integrate research capacities across Europe in assessing changes in biodiversity, analysing the effect of those changes on ES and informing policymakers and the public about this at a European scale. OPERAS will collaborate with ALTER-net in the summer school and use ALTER-net dissemination channels	PIK, VU- IVM, UFZ, CSIC, FFCUL
European Land Use Institute (ELI)	The ELI brings together SMEs and academic institutes on applied land use science in order to achieve a network for innovative sustainable solutions to land use. The ELI community will be invited to participate in the OPERAS CoE	UFZ, ETH, VU-IVM
DIVERSITAS	An ICSU Global Environmental Change programme, DIVERSITAS spawned the GEO BON network which focuses on improving the availability of biodiversity and ES observation data. DIVERSITAS includes a core project (ecoServices) focused on understanding the links between biodiversity, ES and ecosystem functioning and impacts on human wellbeing	WCMC
PECS - Ecosystem Change and Society	A new joint programme of ICSU and UNESCO, PECS will explore policies and practices that affect the resilience of the portfolio of ES that support human well- being and allow adaptation to a changing environment	WCMC via collaborations with CSIR, SRC.

Collaboration with the OPENness project

Collaboration of OPERAs with the OpenNESS project will be on the basis of the following activities:

- 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.

B 3.2 Plan for the use and dissemination of foreground

Dissemination and exploitation

OPERAs is undertaken jointly by academics, research institutes, NGOs and SMEs that bring specific strengths in the process of bridging science and practice. OPERAS will develop the CoE as a network of ES/NC tool users, providers, and researchers, with the goal of promoting ecosystembased management in a wide range of contexts. The CoE will be served by the online CP, to help a broad range of users to find, share, and contribute knowledge, information and resources for innovative, interdisciplinary, ecosystem-based management. The Resource Hub will be a major online facility developed to ensure dissemination and exploitation of the OPERAS outcomes beyond the life of the project. The Resource Hub will contain the ES/NC knowledge base of available instruments, processes and tools, along with guidance for deciding on the appropriate methods for a given socio-ecological context. It will also contain best practice guidelines for deploying the ES/NC approach, supplemented by descriptions and short movies of best practice produced for the exemplars. Field tours with journalists will be organised to the exemplar case studies. There is a crucial role here for the SME and NGO partners in applying the new knowledge, methods and instruments in practical applications with stakeholders. Some of the SME partners have strong expertise in the process of stakeholder engagement whilst others work on the deployment of instruments in practice. Within the whole project, but especially in the exemplars, SME partners and academic/research partners will work together as teams to enhance the valorisation of knowledge and provide a starting point for the CoE. Business plans will be put in place with the SMEs to support the marketing and exploitation of products that arise from the instrument development research. OPERAS will also generate policy briefs, press releases and short contributions to the popular press. Target groups for these activities include business organisations and their representatives Europe-wide, community representatives, local authorities and planners, licensing agencies and, through journalists, the European public.

(1) Any dissemination activities and publications in the project, including the project website will (i) specify that the project has received Community research funding and (ii) display the European emblem. When displayed in association with a logo, the European emblem will be given appropriate prominence.

(2) All publications shall include the following statement (from GA art.II.30.4): "The research leading to these results has received funding from the European Community's Seventh Framework Programme under Grant Agreement No. FP7-ENV-2012-308393-2 (OPERAs)."

Addressing challenges in dissemination

The OPERAs consortium is acutely aware of the challenges in implementing a successful dissemination strategy. Dissemination and communication of FP project results often suffer from a limited time period for dissemination, because the most valuable outcomes often materialise only at the end or even after completion of the project, when project funding is no longer available. OPERAs will invest considerable effort into the CP with a focus on dynamic delivery to identified user needs, rather than simple dissemination, and will carefully plan for its post-project accessibility and perennity. The OPERAs web portal will be maintained by UEDIN and other partners for at least five years after project completion. Longer term maintenance of the OPERAs Resource Hub and its content will be articulated in the business plan (Deliverable D5.6). In recent years more attention is being paid to ensuring open access of data, research papers and tools/instruments, and OPERAs advocates open access choices as part of the consortium agreement. Partners will strive to publish in freely available literature, as project reports, peer-reviewed journal papers (preferably in 'open access' journals), web material, or other media and will implement the "unrestricted online (ftp://ftp.cordis.europa.eu/pub/ EU-funded access to research results" fp7/docs/project reporting en.pdf) giving access to peer reviewed results after an initial embargo of 6-12 months. The design of the Resource Hub aims at full open access to OPERAS findings. The establishment of a CoE beyond the project lifetime targets the operational use of ES/NC concepts in land, urban and water management. A key element of the business plan will be to propose appropriate subscription models for selected user groups to access professional training, guidance and accreditation while the tools/instruments remain open access as far as possible. OPERAS explicitly tackles further dissemination challenges in the project design through: 1) involvement of partners (especially SMEs) with experience in cutting edge dissemination and web-technologies within the consortium; 2) the development of dissemination materials targeted at specific user groups, based on the appropriate language and providing exemplar cases that address the target group; 3) the involvement of consortium partners specialized in stakeholder interaction.

Addressing challenges in policy and stakeholder engagement

As with the dissemination process, it can take a long time for FP project results to be implemented and integrated into policies. An additional level of complexity is added by the diversity of local, national, and regional policy across the EU. However, a systematic and efficient science-policy dialogue (as well as dialogue with other stakeholders) is essential to improve the use of scientific results by policy makers and society in general. OPERAs will establish and maintain continuous science-policy interfaces throughout the project and at various scales (from local to European). To ensure the active engagement of stakeholders, the science-policy dialogue will be centered around the exemplar studies, which will concentrate on real-issues for which stakeholders are part of a joint-learning process of operationalising the ES/NC concepts. At the European level, sciencepolicy interface mechanisms will involve key policy-makers and other stakeholders, especially DG Environment, DG Agriculture, members of the European Parliament and of national parliaments, the European Topic Centre for Biodiversity, the European Environmental Agency, the Scientific Working Group of the Habitats Committee (in which all Member States are represented), and NGOs. Mechanisms include: 1) professional facilitation of science-policy interactions and stakeholder dialogue; 2) involvement of key stakeholders in the Advisory Council to ensure that project activities are targeted towards the needs and expectation of stakeholders; 3) key stakeholders will be invited to OPERAs project meetings to inform OPERAs partners of important developments in their policy areas and to discuss the design and results of the research activities. This will form the genesis of the CoE which will be informed by, and built around, the Resource Hub; 4) OPERAS will avoid one-way communication with the general public, but rather use Web 2.0 tools to engage the public in ES/NC issues (e.g. by launching app-based ES/NC shopping guides) and use social media to assess public opinion on new instruments; 5) ad-hoc advisory groups to meet specific stakeholder/policy demands leading to rapid mainstreaming of the project findings; and also using the 6) regular dissemination through press releases, papers in practitioner journals, policy briefs, web-page and short movies (on YouTube). Targets and planning for these releases will be set in the dissemination strategy in consultation with the advisory council. In addition, during the mid-term review of the project the dissemination strategy will be reconsidered and adapted to the experiences during the first half of the project (without affecting the overall project objectives as established in Annex 1 of the Grant Agreement).

Management of knowledge (intellectual property)

As far as possible, the knowledge generated within OPERAs will be made public during the lifetime of the project, to enhance feedback and adaptive learning. OPERAs adheres very strictly to the principles of free and open exchange of data and knowledge. All issues related to the intellectual property developed under OPERAs will be discussed and integrated within the Communication and Dissemination Strategy. A code of conduct will be developed to ensure that project partners are appropriately acknowledged for material they provide to each other when publications are prepared, including the acknowledgement of OPERAs as a funding source. Intellectual Property Rights, Rules on dissemination and use, Access Rights, Liability, Confidentiality and Indemnification arrangements between the partners will be described and appointed in a Consortium Agreement. The Desca Simplified FP7 Model Consortium Agreement will be used as the basis for this agreement, in accordance with EU regulations. The Coordinator will be responsible for ensuring that all partners comply with the terms of the Consortium Agreement with respect to the Intellectual Property Rights of the research and technology developed in OPERAs.

As OPERAs aims to produce innovative products that are valorised beyond the project lifetime, policies to achieve this will be described in the consortium agreement. In the event that a partner generates patentable material, the generating partner will notify the PMT of this matter. Care will be taken to ensure that nothing is done to jeopardise the ability to patent the information through premature disclosure until the generating partner has either decided not to patent or has filed a patent application. The consortium will make all necessary endeavors for optimum valorisation of patentable inventions involving several institutions or SMEs. As a general principle, it is intended that the institutions responsible for a joint invention will be jointly in charge for completing an application for a patent, with shared intellectual ownership rights negotiated between the relevant partners on a case-by-case basis and governed by separate agreements. OPERAs will encourage partners to endorse the <u>Open Database License</u> (PDbL; Open Data Commons 2010) with its social and professional norms for acknowledgement and placing derived work in the public domain, using the Resource Hub as its main gateway, but not excluding the contribution of project results to other databases worldwide.

Finally, all OPERAs partners have agreed to adhere to **Good Scientific Practice.** Good scientific practice is based on the principles of scientific eloquence, conscientiousness and communication. This includes encouraging constructive criticism backed by scientific evidence and freedom to voice one's opinions independent of the hierarchical position of those involved, the responsibility to acknowledge, respect and quote the priorities of others in terms of ideas and results in the past and present as well as being able to accept constructive criticism and admit to one's own errors and mistakes. Dealing with such issues constructively without discrediting other scientists is an integral part of scientific communication and belongs to the most meaningful achievements of our scientific

culture. To enable the verifiability as well as the objective criticism of scientific results, scientific primary data is indispensable. As long as such data is the basis of publications, patents or running RTD work, it should be kept on a secure medium, accessible to the partner organisations for at least ten years.

B4. ETHICAL ISSUES (IF APPLICABLE)

As the objectives, methodology and foreseen results of the project have no ethical constraints, no authorisation from an ethical committee or other bodies is required to carry out the work programme for this project. The following table – as provided in the guide for proposers, Annex 4 – indicates that the project raises no ethical questions.

Research on Human Embryo/ Foetus	YES	Page
Does the proposed research involve human Embryos?	No	
Does the proposed research involve human Foetal Tissues/ Cells?	No	
Does the proposed research involve human Embryonic Stem Cells (hESCs)?	No	
Does the proposed research on human Embryonic Stem Cells involve cells in culture?	No	
Does the proposed research on Human Embryonic Stem Cells involve the derivation of cells from Embryos?	No	
I CONFIRM THAT NONE OF THE ABOVE ISSUES APPLY TO MY PROPOSAL	Yes	

Research on Humans	YES	Page
Does the proposed research involve children?	No	
Does the proposed research involve patients?	No	
Does the proposed research involve persons not able to give consent?	No	
Does the proposed research involve adult healthy volunteers?	No	
Does the proposed research involve Human genetic material?	No	
Does the proposed research involve Human biological samples?	No	
Does the proposed research involve Human data collection?	No	
I CONFIRM THAT NONE OF THE ABOVE ISSUES APPLY TO MY PROPOSAL	Yes	

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YES Page

Does the proposed research involve processing of genetic information or personal data (e.g. health, sexual lifestyle, ethnicity, political opinion, religious or philosophical conviction)?	No	
Does the proposed research involve tracking the location or observation of people?	No	
I CONFIRM THAT NONE OF THE ABOVE ISSUES APPLY TO MY PROPOSAL	Yes	

Research on Animals	YES	Page
Does the proposed research involve research on animals?	No	
Are those animals transgenic small laboratory animals?	No	
Are those animals transgenic farm animals?	No	
Are those animals non-human primates?	No	
Are those animals cloned farm animals?	No	
I CONFIRM THAT NONE OF THE ABOVE ISSUES APPLY TO MY PROPOSAL		

Research Involving non-EU Countries (ICPC Countries ¹)	YES	Page
Is any material used in the research (e.g. personal data, animal and/or human tissue samples, genetic material, live animals, etc) :		
a) Collected and processed in any of the ICPC countries?		
b) Exported to any other country (including ICPC and EU Member States)?		
I CONFIRM THAT NONE OF THE ABOVE ISSUES APPLY TO MY PROJECT	Yes	

Dual Use	YES	Page
Research having direct military use	No	
Research having the potential for terrorist abuse	No	
I CONFIRM THAT NONE OF THE ABOVE ISSUES APPLY TO MY PROJECT	Yes	

¹ In accordance with Article 12(1) of the Rules for Participation in FP7, 'International Cooperation Partner Country (ICPC) means a third country which the Commission classifies as a low-income (L), lower-middle-income (LM) or upper-middle-income (UM) country. Countries associated to the Seventh EC Framework Programme do not qualify as ICPC Countries and therefore do not appear in this list.

B5. GENDER ASPECTS (OPTIONAL)

OPERAs will provide equal opportunities, independent of gender, to participating researchers and scholars. Its research activities feature no gender-biased characteristics and will address women's needs, as much as men's needs. Women have a relatively high representation in the Commission's environmental research programme and within the OPERAs project women have a clear role (and strong representation in the project management), co-leading WP2 and WP3, leading Tasks 2.2, 2.3, 3.1, 4.3 and 5.1 and as Principal Investigator in seven partner teams. From the beginning several women were involved in the project design and the coordination of the project planning activities. Women are also well represented in all disciplines in the WPs, currently forming about 30% of the project's proposed team. OPERAS will strive to further improve the gender balance for the project. Many partners will hire fixed-term staff and this will generally be done under the specific conditions of the individual partner institutes, most of whom have the means to ensure equal opportunities, such as working groups for gender equality, committees for equal opportunities, or specific gender action plans. As a general rule, these plans specify that in cases of equal qualifications, female applicants are preferred to obtain a balanced proportion of women, particularly in science and management. Application of female researchers will be encouraged. The project will promote and disseminate the values and practices underlying gender equality, will improve understanding of issues related to gender equality and will encourage partner organisations to promote gender equality effectively. These actions will be reported to the highest management levels within the project, ensuring that gender will be mainstreamed throughout all aspects of the project. The OPERAS Project Management Team will support the OPERAS researchers in their activities and consider their individual situation and specific needs. Thus, we not only understand gender mainstreaming as the promotion of women, but also as the support of early career scientists and the consideration of family obligations.

Within OPERAs, we will make strong attempts to accommodate any researchers with family commitments. Flexible working patterns are commonly accepted at most partner institutions. Furthermore, OPERAs will, in planning its meetings, stakeholder engagement and other activities, restrict travel in school holidays and weekends and support the use of video conferencing to enable participation in meetings when travel cannot be combined with family circumstances. Gender issues will be monitored during the project by the PMT.

Stakeholder participation is an important part of the OPERAS project, and stakeholder participation in workshops will actively seek a gender-balanced representation.

Care will be taken to ensure that presentations on the work of the consortium, in particular conference talks, press releases, journal articles and workshop reports give a strong profile to the role of female participants, providing effective role models and projecting a non-gender specific image of science.

OPERAS will appoint an individual (agreed by the General Assembly) to monitor the consideration of gender issues, address concerns of individual participants and propose adequate solutions to the PMT.

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