



LIFE Project Number

LIFE12 ENV/UK/000473

Inception Report

Covering the project activities from 1/7/2013 to 30/6/2014

Reporting Date

04/08/2014

LIFE+ PROJECT NAME or Acronym

NaturEtrade

[Redacted version]

1. Table of contents

2. List of abbreviations.....	3
3. Executive summary.....	3
3.1 General progress.....	3
3.2 Assessment as to whether the project objectives and work plan are still viable.....	3
3.3 Problems encountered.....	3
4. Administrative part.....	4
4.1 Description of project management	4
4.1.1 Meetings.....	4
4.1.1.1 Project team meetings	4
4.1.1.2 Stakeholder meetings	4
4.1.1.3 External meetings – Dissemination activities	5
4.1.1.4 LIFE+ meetings.....	5
4.2 Organigramme of the NaturEtrade project team and the project management structure.	6
5. Technical part.....	6

5.1 Actions	7
5.1.1 Action 1: (B1: Development of EcoSET)	7
5.1.1.1 Sub Action B1 (1) Data acquisition for ecosystem service layers	7
5.1.1.2 Sub Action B1 (2) Adaptation of the ecological layers from LEFT	9
5.1.1.3 Sub Action B1 (3) Development of models, algorithms and datasets	10
5.1.2 Action 2: (B2: Creation of NaturEtrade).....	11
5.1.2.1 Sub Action B2 (1) Design and set-up of NaturEtrade website	11
5.1.2.2 Sub Action B2 (2) Development of mobile data capture device.....	12
5.1.2.3 Sub Action B2 (3) Development of NaturEtrade database structure	19
5.1.2.4 Sub Action B2 (4) Linking EcoSET and NaturEtrade	19
5.1.3. Action 3: (B3: Standard contracts/verification tool)	20
5.1.3.1 Sub Action B3 (1i) Existing contracts for Ecosystem Services reviewed	20
5.1.3.1 Sub Action B3 (1ii) Review of similar web-based platforms	21
5.1.3.2 Sub Action B3 (2) Governance arrangements devised	21
5.1.3.3 Sub Action B3 (3) Develop and market testing of pilot contracts	22
5.1.4. Action 4: (C1: Monitoring of impact of EcoSET and NaturEtrade)	23
5.1.4.1 Sub Action C1 (1) Rates of land-use change determined	23
5.1.5. Action 5: (D1: Dissemination and communication)	23
5.1.5.4 Sub Action D1 (4) Knowledge exchange workshops run	23
5.2. Availability of appropriate licences and authorisations	24
5.3. Envisaged progress until next report.	24

2. List of abbreviations

LEFT	Local Ecological Footprinting Tool
EcoSET	Ecosystem Service Evaluation Tool
CIFOR	Center for International Forestry Research
ESA	European State Agency
FAO	Food and Agriculture Organisation of the United Nations
IMDE 2014	Insurance Model & Data Expose 2014
NERC	Natural Environment Research Council
UNEP-WCMC	United Nations Development Programme - World Conservation Monitoring Centre

3. Executive summary

3.1 General progress.

The project is on track and within budget. On the basis of this review at the end of almost 9 months' work, we believe that the project objectives and work plan are still valid. Most milestones and deliverables have been finished within the time projected. Delays in completion have mostly occurred after Team discussions, and agreement that there is benefit from waiting for 6-12 months to achieve a better result. One action – the knowledge exchange workshop, projected for June 2014, has not yet taken place owing to the delayed start of the project (November rather than July 2013). The University was formally informed of the success of the bid on 9 July, 2013 and was able to recruit staff and put in place the necessary financial & reporting arrangements by November 2013. This was discussed in a telephone conversation between Arnoud Heeres (ENV) and Joanna Frost (Research Services University of Oxford) on Thursday, August 22, 2013 and the outcome of that phone call was documented in an email of the same date from Ms Frost to Mr Heeres. It is at an advanced stage of planning, however, and will occur in September 2014. Administration across all working packages has been smooth and communication is working well through a combination of formal bi-monthly meetings, emails and workshops addressing specific tasks. Helpful feedback and advice was received from the LIFE Monitoring Team UK/IE. The project has made contact with other LIFE+ projects and attended a useful 2-day knowledge-sharing workshop in the UK. Members of the project team have presented NaturEtrade at several meetings in the UK and overseas, where it has been well received.

3.2 Assessment as to whether the project objectives and work plan are still viable.

At this stage the project objectives and work plan appear to be viable.

3.3 Problems encountered.

None.

4. Administrative part

4.1 Description of project management

4.1.1 Meetings

4.1.1.1 Project team meetings

Meetings for all members of the project team were held on:

6th Oct 2013

17th Dec 2013

4th Feb 2014;

10th Mar 2014

The June meeting has been delayed until September to accommodate absences and holidays. In addition, the project manager met regularly with project personnel within the University of Oxford to discuss progress in the Actions. Weekly meetings were held with the Sylva Foundation, which has been subcontracted to provide Action B2 – Creation of NaturEtrade. A Dropbox was established as a means of internal communication. Details of work progress, meetings attended, relevant academic papers, presentations, photographs, and discussion documents are posted there with full access to all. It is currently our main communication tool as the decision was taken early on to keep full-project team meetings short and focussed, with detailed discussion occurring in smaller groups or online. This appears to be working well.

4.1.1.2 Stakeholder meetings

Two meetings were held with one of the key stakeholders on 14 March and, an extended meeting, 1 May, 2014. Craigmores Farming (and in particular Craigmores Sustainables) has been identified as an important stakeholder for NaturEtrade because of their interest in mapping risk in agricultural investments and their wide knowledge of farmers' attitudes and investment behaviour in different countries. Their Head of Research is Professor Charles Elworthy, a Visiting Fellow at the Smith School of Enterprise and the Environment, whose interests tie in closely with those of NaturEtrade. His principal research focus is investment in natural real assets, especially farmland. His group has actively started collaborating by testing the use of EcoSET layers in the development of the Map of Agriculture, currently being developed by the Oxford Natural Resource Alliance. This is an initiative of academic and private-sector institutions, led by the Smith School and Craigmores Sustainables, to gather, analyse, and publish agricultural and other natural resource data. These links are of value to NaturEtrade going forward. See also other individual meetings with stakeholders listed in 5.1.3.1. Feedback from these meeting has helped shape the knowledge exchange workshop due to take place in September 2014 and provided links to potential useful technical datasets that will be evaluated for value-added in NaturEtrade.

4.1.1.3 External meetings – Dissemination activities

Members of the project team have presented NaturEtrade at the following meetings:

8th Nov 2013 Environmental MPs and researchers' networking event, Parliament
20th Jan 2014 National Biodiversity Network meeting, Natural History Museum, London
24th Jan 2014 Kings College London
29 Jan 2014 Oxford Tree Club, Oxford
5th Feb 2014 Office of Barry Gardiner MP, Parliament (Opposition Spokesman for the Environment)
20th Feb 2014 Oxford Martin School Tools and Technologies meeting - Biodiversity tools
21 Feb 2014 Evidence for Landsparing/Landsharing open meeting, CIFOR, Bogor, Indonesia
27th Feb 2014 University of Cambridge
25th Mar 2014 FAO and ESA, Rome
26 March 2014 Royal Forestry Society Oxon-Bucks Division, Oxford
28th Mar 2014 Simon Jackman, NERC Innovation
3rd Apr 2014 WWF, Madagascar
14th May 2014 EU LIFE platform meeting, Norfolk
15th May 2014 University of Bergen
19th May 2014 WWF UK
17th June UNEP-WCMC, Cambridge
2nd July IMDE 2014 forum, London

Forthcoming

26 February 2015 - Natural Capital Academic and Stakeholder Seminar Series, Smith School of Geography and the Environment, University of Oxford

4.1.1.4 LIFE+ meetings

22nd Oct 2013 - LIFE12 Kick-off Meeting, Copenhagen (two project team members)
14th-15th May 2014 LIFE Platform Meeting - Climate change – ecosystem services approach for adaptation and mitigation, Norwich (see Figure 1)



Figure 1 LIFE Platform meeting participants, Norwich, UK

4.2 Organigramme of the NaturEtrade project team and the project management structure

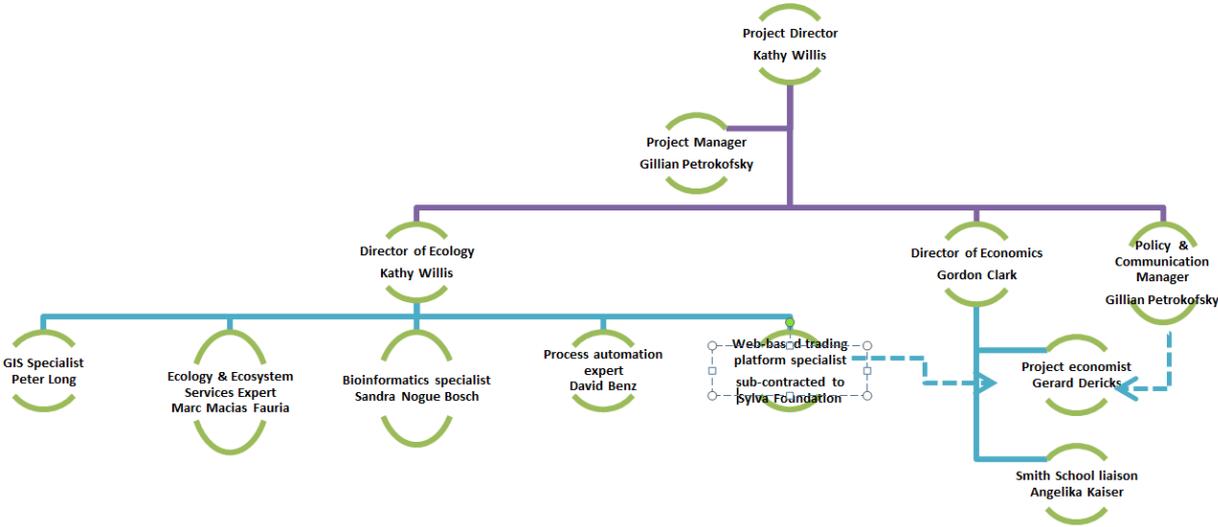


Figure 2 Organigram for NaturEtrade

5. Technical part

Around 1500 ha of biodiverse land are lost in the EU every day to changes in infrastructure and urbanisation, with serious implications. Land conversion directly affects key ecosystem services supporting climate change, natural infrastructure and sustainable use of natural resources. NaturEtrade will demonstrate a novel approach that will enable EU landowners rapidly to assess the ecological potential of their land using simple-at-point-of-use tools developed from complex data sets and then to trade (by leasing) the ecosystem services with other landowners, businesses and others with a stake in land conservation. Landowners will be drawn from individuals and organisations owing land privately or those responsible for publically-owned land. Types of traders and their aspirations will be assessed in stakeholder workshops in the four countries of the project: UK, Spain, Croatia, Romania. Four interlinked Actions implement the project objectives.

5.1 Actions

These are reported based on the original *Annex 1: Table detailing timing of actions, milestones (M1-M15) and deliverables (D1- D19)*. Some of the expected deliverables for Year 1 were not marked as either Milestones or Deliverables (owing to an oversight); these have been corrected, the Table amended in a new GANTT, which is appended as Annex 3, and reported on.

5.1.1 Action 1: (B1: Development of EcoSET)

The Local Ecological Footprinting Tool (LEFT) was developed before NaturEtrade was conceived for mapping a set of ecological landscape values, with a web-based interface that works on latitudinal/longitudinal co-ordinates input by a user which are submitted for assessment via algorithms that lie ‘behind the scenes’. The LEFT tool uses existing globally available web-based databases and models to provide a summary ecological score based on five key ecological criteria (biodiversity, fragmentation, threatened species, connectivity and resilience) at a pixel resolution of 300 metres and works for any land parcel in the world. The tool is easy to use, enabling non-specialist landowners or stewards to enter information and provides rapid output in an accessible format. It can be accessed publicly by creating a user account at <https://left.zoo.ox.ac.uk:8443/left/login.html>.

This has been used and accepted by a wide variety of stakeholders, including the oil and mining industry and environmental consultants. Annex 4 provides logon details and user feedback. NaturEtrade uses the existing LEFT tool to form the framework for a new automated tool (Ecosystem Service Evaluation Tool (EcoSET)). The development of the EcoSET tool entails increasing the spatial resolution to every 100m, adding five ecosystem service values (pollination delivery water regulation, climate regulation, soil erosion prevention and cultural services) to the five existing ecological values.

5.1.1.1 Sub Action B1 (1) Data acquisition for ecosystem service layers

**Milestone 1 – started November 2013, due: July 2014. Milestone amended to July 2016.
Status: ongoing**

Sub-Actions taken as part of M1:

Acquire data for ecosystem service layers and develop tiling scheme for Europe.

Establish spatial data granule databases, set up automatic geoprocessing servers.

Prepare ancillary data sets across Europe which are needed for ecosystem service evaluation including digital elevation models and climate data.

We have completed acquisition of the data exclusively required for production of ecosystem service layers. Flickr records have been obtained for Europe which are used in mapping recreational amenity. A table of pollinator species in Europe and their attributes has been prepared, GBIF records for these species retrieved, pollinator-relevant environmental covariates have been produced and distribution models for these pollinators have been made and validated, allowing a static map of pollination service provision to be made for Europe.

We have amended our Milestones table to reflect the fact that FINAL data acquisition for ecosystem service layers is ongoing throughout the project. Our original estimate of completion by July 2014 was unrealistic, and related only to acquisition of sufficient layers to enable robust demonstration of the potential for NaturEtrade. Final production of all ecosystem service layers, and their automatic production in time-series is an ongoing task, and is also dependent on the completion of action *B1.3 'Adaptation of ecological layers from LEFT' - Milestone 2*, due December 2014; action *B1.3 'Development of models, algorithms and datasets' - Milestone 3*, due July 2015; action *B1.4 'Automation of the Ecoset tool' - Milestone 4*, due July 2016. For example, the algorithm for calculation of soil erosion protection has been selected (RUSLE), tested and we know how to implement it for bulk processing. However this depends on having finished the production of the climate observations and land cover data (which are generic to the whole of NaturEtrade, rather than being exclusively required for ecosystem service layers).

A private company – Tesella, with whom we worked on LEFT – have worked on generating custom styled maps, which will be important in the mobile data capture interface in NaturEtrade. Work is ongoing on 5km climate data for resilience, 30m surface reflectance and land cover classification, pollination services and cultural services data. In order to produce stored environmental data about land, biodiversity and ecosystem services, it is necessary to acquire satellite and other environmental data and process these data to produce derived data products. Climate data is required for use in our resilience algorithm which characterizes vegetation response to climate perturbations through time. Surface reflectance data is a key input into our land cover classification algorithms which are used to map land cover classes and detect change over time, as well as being used as inputs for production of further products such as ecosystem service provision and patterns of biodiversity. We are producing time-series of satellite-observed climate variables at 5km because this is the highest spatial resolution at which a dense time-series of climate observations can be consistently produced with high data quality.

The cultural services layer is at a preliminary stage – to date this has tested the use of Flickr. Flickr records are a sample of events on which someone took a photo in a given location and shared it through social media, possibly because they attach some significance to the location. We are using these records together with maps of environmental variables, such as elevation and land cover, to model the conditional probability of the event of a photo being taken and then submitted to Flickr occurring in a given location. This allows us to map the potential provision of the cultural ecosystem service of recreational amenity across Europe. We are currently using Flickr because it is a widely-used (global) system to upload pictures. The images on Flickr contain spatial and temporal data, which are compatible with those of other layers in EcoSET. We will in due course evaluate other similar services, e.g. Picasa. The workflow for cultural services is shown in Figure 3.

We have set up a file server with 80 Terabytes of storage space for the multiple data sets used by LEFT, EcoSET, and NaturEtrade. We have ordered another 40 TB of space to hold further high-resolution data.

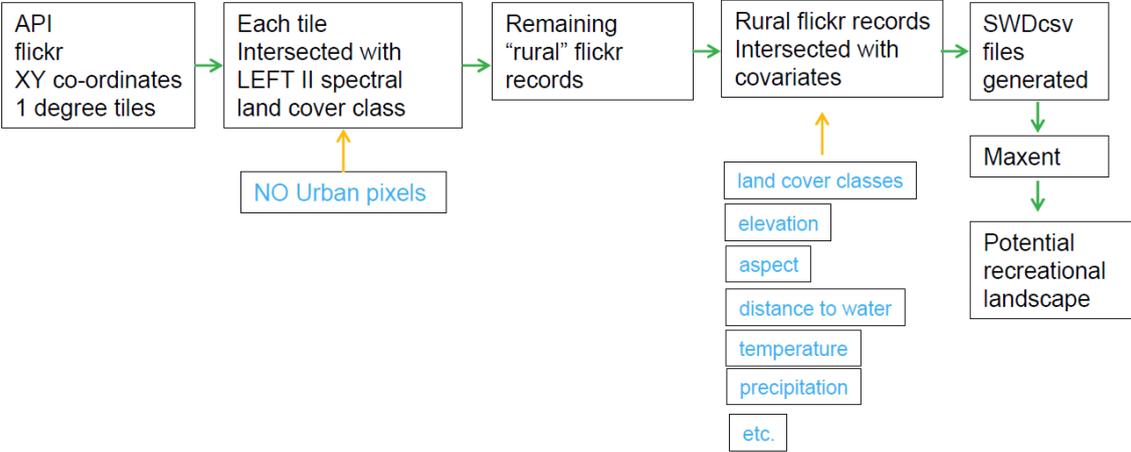


Figure 3 Developing a cultural service layer for NaturEtrade

5.1.1.2 Sub Action B1 (2) Adaptation of the ecological layers from LEFT

Milestone 2 – started January 2014, due: December 2014. Status: ongoing.

- time-series of satellite derived climate observations at 5km is ongoing.
- 30m surface reflectance data has been downloaded and processing to landcover class is ongoing.
- covariates for distribution models have been produced, we have a working mirror copy of the GBIF database, and we have made distribution models for globally threatened species. We are confident that we will reach M2 on time.

Overall, we believe that we have made good progress on Action B1 'Development of Ecoset' since the start of the project, and at this stage we have full confidence that we will be able to meet the target date of 2016 Q2 for deliverables D1 'Completion of GIS web-based tool (EcoSET)', and D2 'Production of report detailing design of EcoSET' The framework and management system of the LEFT tool (MiddleWare) will be used as the 'backbone' to the ecosystem services tools (EcoSET) to be developed in NaturEtrade. Pollination services and Cultural services layers are important additions to layers developed in the first phase of LEFT.

The main emphasis for the next 6 months will be to finalise the pollination layer and complete the cultural service layer. Our aim is to provide a method to automatically assess how we make a map that shows how 'interesting' a place is that prompts a person to take a picture there (see Figure 5).

Timetable for the work is estimated in Table 1.

A dedicated webserver has been set up for EcoSET, using the same "middleware" software behind LEFT. Middleware accepts a user query, retrieves data for the relevant coordinates, prepares maps, inserts them in a report template, and emails the report to the user. The EcoSET website functions within the Zoology Department but will not be made public until the necessary ecosystem services data have been prepared.

Table 1 Workplan for LEFT adaptation – 2014/15

	2013		2014											
	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
hardware														
tessella generic plugin														
template														
download L.M granules														
write landcover scripts														
run landcover														
write frag script														
run frag script														
write elevation+derived scripts														
run elevation+derived														
write wetland script														
run wetlands														
write migratory script														
run migratory script														
download covariates granules														
write covs scripts														
run covs scripts														
join GBIF w IUCN, covs														
generate background, covs														
run Maxent in SWD mode														
write Maxent project scripts														
run Maxent project														
write beta script														
run beta script														
download fine resilience covs														
write script to implement resilience														
run resilience script														
write SEV script														
run SEV														

5.1.1.3 Sub Action B1 (3) Development of models, algorithms and datasets

Milestone 3 – started January 2014, due: July 2015. Status: ongoing

Algorithms for the pollination layers are almost complete, field trials have been conducted to test the applicability of this layer to EcoSET. A preliminary output of this layer (for bees) is shown in Figure 4 and for cultural services in Figure 5.

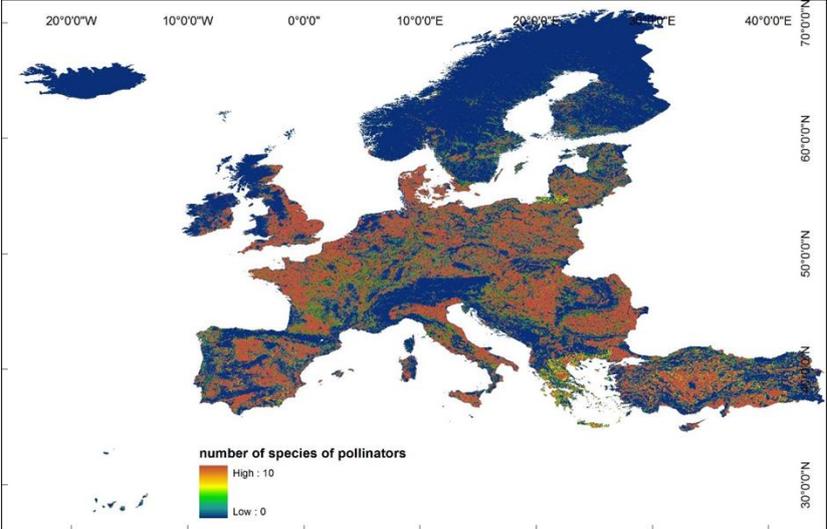


Figure 4 Pollination service layer: bee richness

An academic paper describing this work has been submitted: Sandra Nogué, Peter R Long, Amy E Eycott, Lea de Nascimento, José María Fernández-Palacios, Gillian Petrokofsky, Vigdis Vandvik, Kathy J Willis. Pollination service delivery for European crops: challenges and opportunities. *Biological Conservation* [in review].

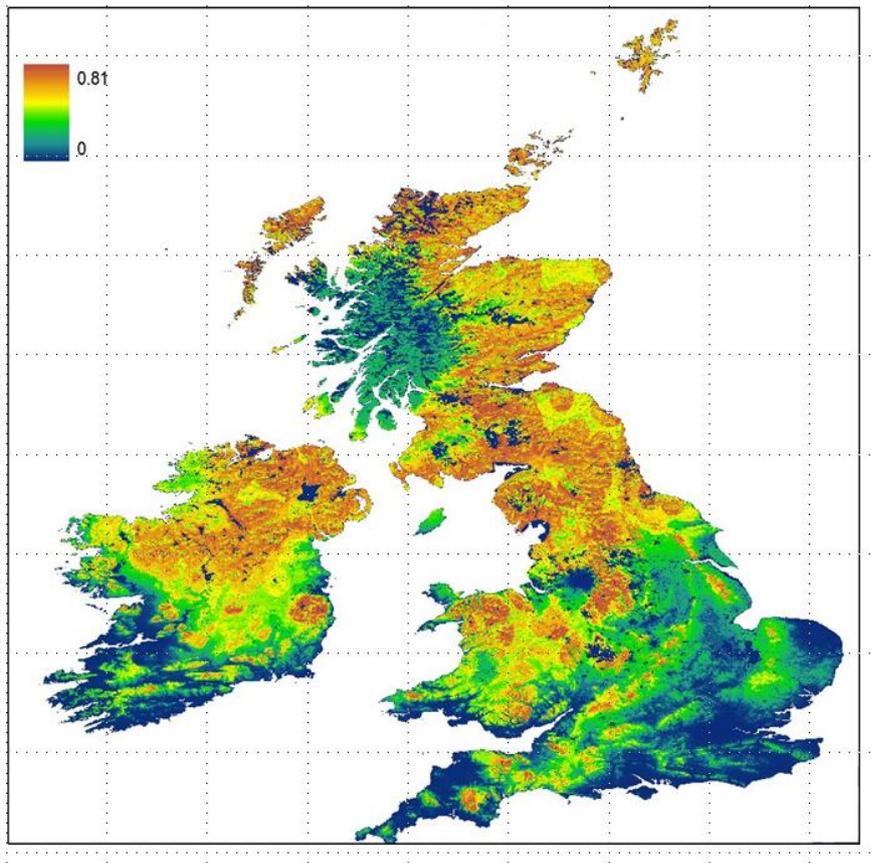


Figure 5 Potential recreational amenity via algorithms of Flickr uploads

5.1.2 Action 2: (B2: Creation of NaturEtrade)

5.1.2.1 Sub Action B2 (1) Design and set-up of NaturEtrade website

Milestone 5/Deliverable 1 – due: December 2013. Status: Milestone and deliverable completed December 2013.

The project website was designed and launched in December 2013 (see Figure 6) The website url is www.naturetrade.net . As and when needed the website is updated with new information regarding the project. Table 2 shows usage statistics for the site. (nb this has not yet been widely publicised outside the departments and organisations directly working on the project)

Table 2 NaturEtrade web statistics

Month	Unique visitors	Number of visits	Pages	Hits	Bandwidth
Apr 2014	74	82	108	255	1002.32 KB
May 2014	332	502	601	2,513	5.60 MB
Jun 2014	322	481	606	1,944	3.87 MB

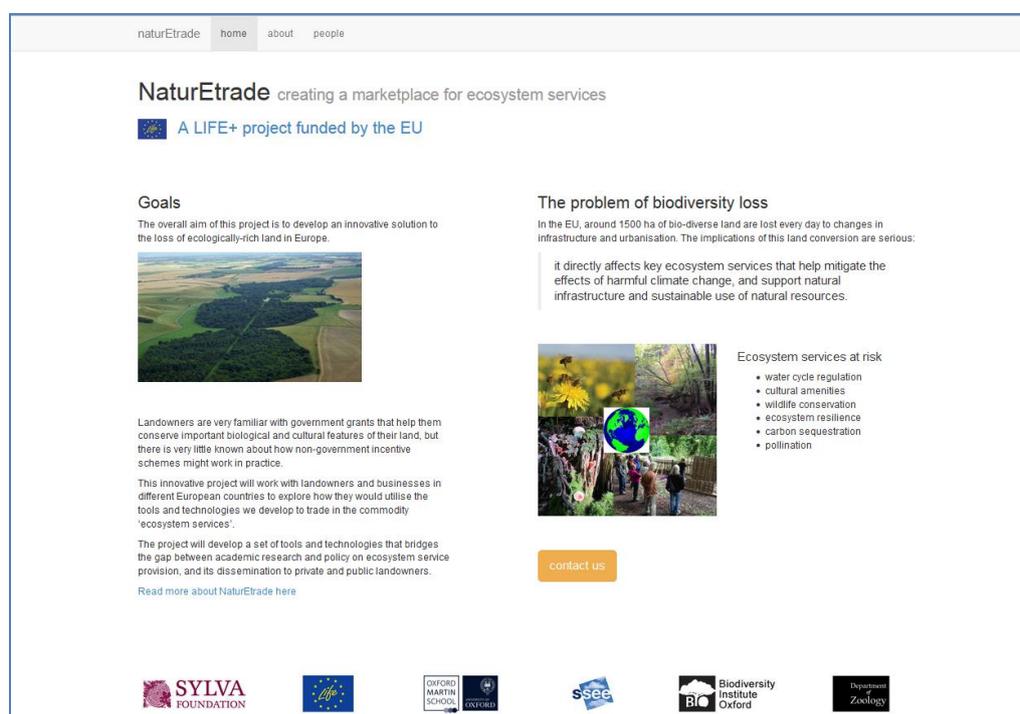


Figure 6 NaturEtrade website

5.1.2.2 Sub Action B2 (2) Development of mobile data capture device

Deliverable 1- due: July 2014. Status: Deliverable completed July 2014

The mobile data capture software has been developed by the Sylva Foundation in conjunction with the Long-term ecology lab in Oxford. It has been designed to function on smart phones and tablets and can be accessed by a desk top computer (see Figure 7). It enables a land owner or manager to capture all of the areas of their property in their NaturEtrade user account (see Figure 8). The url for this website is currently open for external testing (but not publicised) at <http://129.67.24.121> (see Figure 8).

Accurate mapping of this information is essential as it sets out the area that will be assessed for ecosystem service characteristics as well as the prospective areas for which ecosystem

services will be measured (under contract) to investors who will purchase the ecosystem services that the defined area of land provides for periods of time.



Figure 7 Application of mobile data capture in the field

A screenshot of a web browser displaying the NaturEtrade user account creation page. The page has a navigation bar with 'N', 'about', 'people', 'map', and a user profile 'Alistair'. The main content area is titled 'NaturEtrade creating a marketplace for ecosystem services' and includes a sub-header 'A LIFE+ project funded by the EU'. There are two main sections: 'personal details' and 'update password'. The 'personal details' section has input fields for 'first name' (Alistair), 'last name' (Yeomans), and 'email' (alistair@sylva.org.uk), followed by an 'update details' button. The 'update password' section has input fields for 'current password' (old password), 'new password', and 'repeat new password', followed by an 'update password' button.

Figure 8 The basic user account created on NaturEtrade

The mapping system has been developed using the open source software OpenLayers and Open Street Map. The system has been made as flexible as possible with a view to using different tile imagery as required. The data (land area) capture phase of the mapping system has been tested in each of the four countries that NaturEtrade is working in directly: United Kingdom; Spain; Romania and Croatia (see examples of user accounts for land parcels in these countries in Figure 9). The system is able to function across the European Commission area, both for user registrations and mapping land areas.

your groups

+ add group

College Farm inner

delete

A

edit

delete

B

edit

delete

+ add polygon

College Farm outer

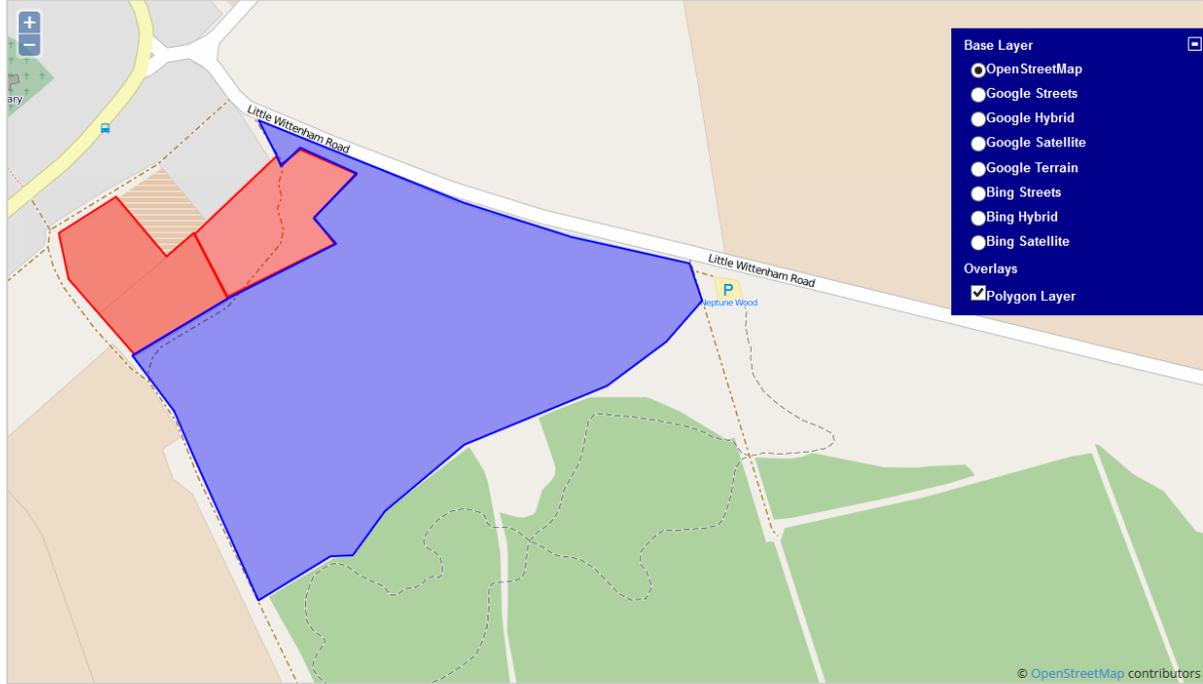
delete

C

edit

delete

+ add polygon



N about people map Alistair ▾

your groups + add group

■ College Farm inner, Little Wittenham, Oxon delete

A edit delete

B edit delete

+ add polygon

■ College Farm outer, Little Wittenham, Oxon delete

C edit delete

+ add polygon

■ Finca - Mallorca, Spain delete

Olive Grove A edit delete

OLive Grove B edit delete

Forest area edit delete

+ add polygon

© 2014 GeoEye © 2014 Bion © 2014 Microsoft Corporation. All rights reserved.

N about people map Alistair -

your groups + add group

■ College Farm inner, Little Wittenham, Oxon delete

A edit delete

B edit delete

+ add polygon

■ College Farm outer, Little Wittenham, Oxon delete

C edit delete

+ add polygon

■ Finca - Mallorca, Spain delete

Olive Grove A edit delete

OLive Grove B edit delete

Forest area edit delete

+ add polygon

■ Croatia - Island off Dubrovnik delete

Area on island edit delete

+ add polygon

■ Area near Bucharest delete

Forest land in Romania edit delete

+ add polygon

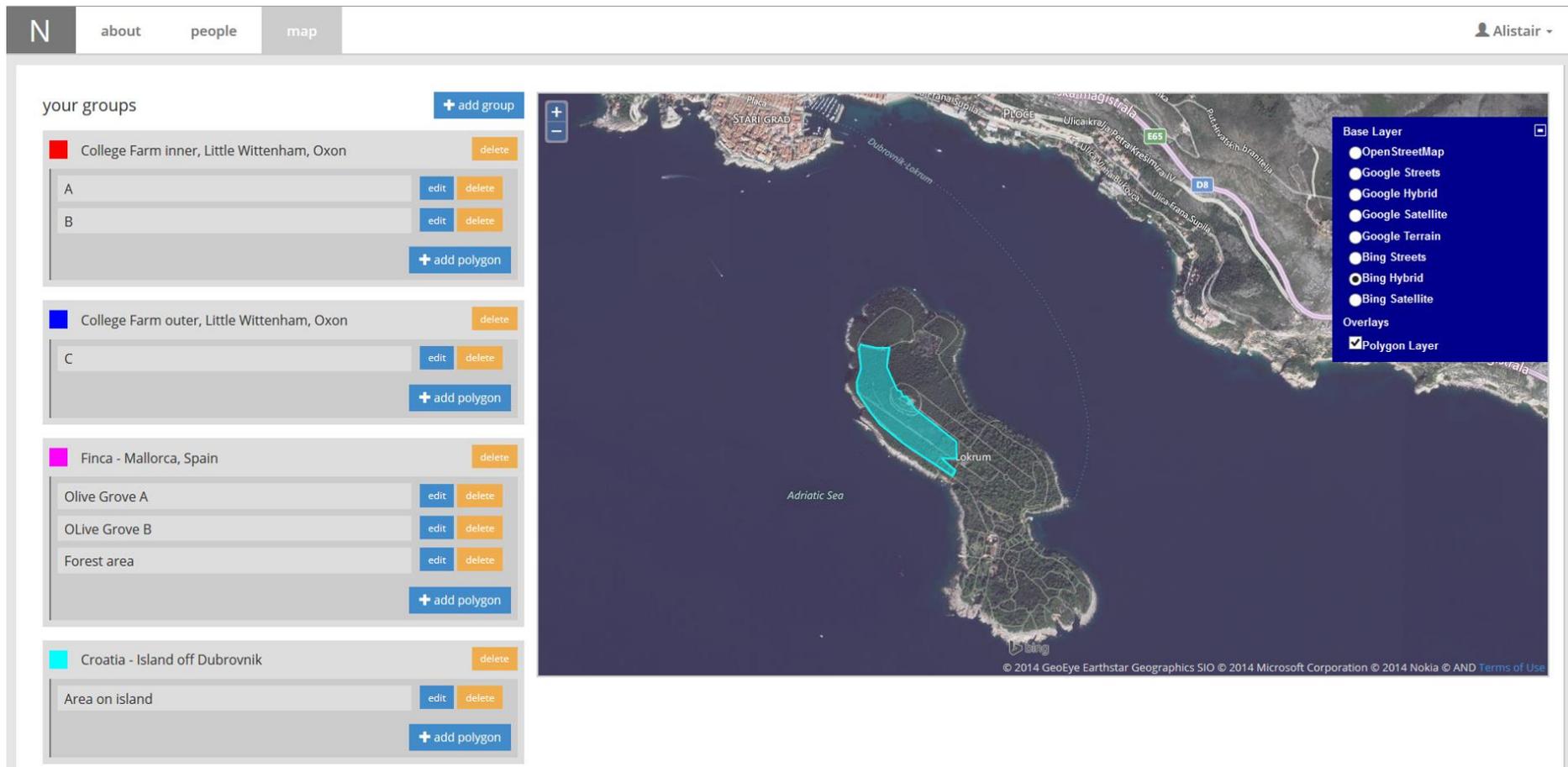


Figure 9 Mobile data capture interface – example of owner accounts in case study countries

5.1.2.3 Sub Action B2 (3) Development of NaturEtrade database structure

Milestone 6 – due: July 2014. Status: Milestone completed July 2014

The database schema has been designed and documented, a PostgreSQL database has been created on the webserver and it has been linked to the web (and mobile) interface for spatial data capture. Additionally several technical meeting have taken place between Richard Piggott, Peter Long and David Benz to develop a shared understanding of the system and promote integration of the PostgreSQL database with other components of NaturEtrade. The database structure has been developed to log information on the property owner and geospatial data on the property area. The database has been structured so that additional information can be added to the database as the project progresses. This additional information will relate to a variety of map layers detailing the ecosystem characteristics.

5.1.2.4 Sub Action B2 (4) Linking EcoSET and NaturEtrade

Milestone 7 - started April 2014, due: April 2016. Status ongoing

Work has started on the linking of EcoSet and NaturEtrade, including holding several technical meetings to design the system architecture, select the appropriate geospatial software and plan how data will be stored, processed, documented and served to users of EcoSet and NaturEtrade. We anticipate using the following structure. We are in the first month of this Action and it will be delivered over the coming 2 years.

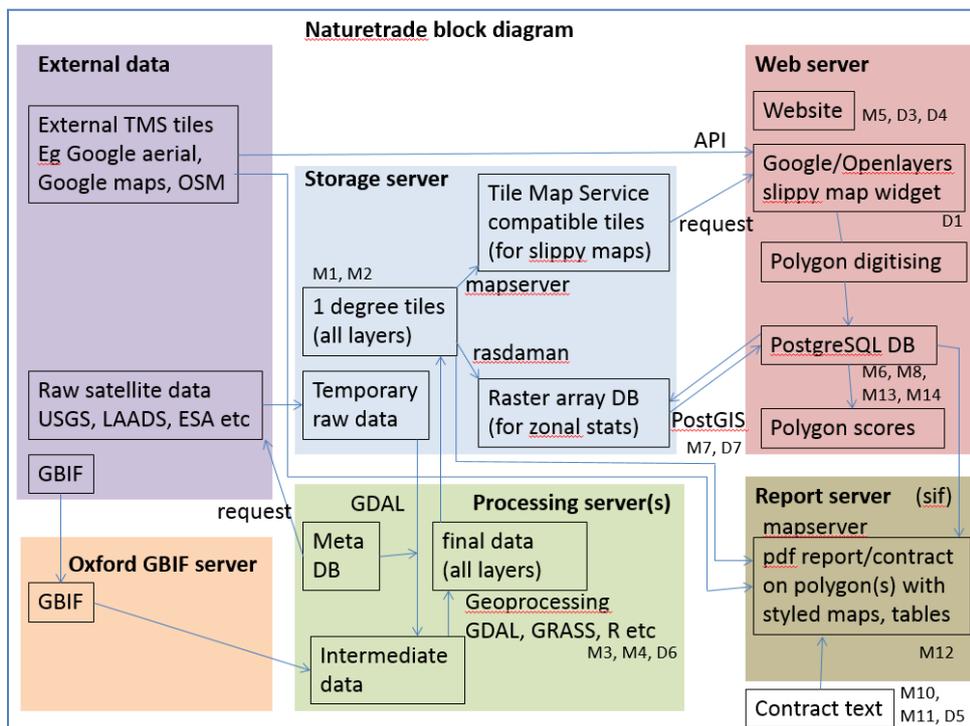


Figure 10 Linking EcoSET and NaturEtrade

5.1.3. Action 3: (B3: Standard contracts/verification tool)

Annex 1 is the review of existing Ecosystem Service contracts. This was peer-reviewed by academics within the Smith School of Enterprise and the Environment and several contacts in government and industry directly involved with the execution of ecosystem services contracts. A brief presentation of the salient points in the review will be made at the stakeholder workshop in September 2014 and at other seminars within the University of Oxford during Michaelmas term (October- December, 2014).

This stakeholder workshop will be facilitated by Justin Adams, a research fellow of the School and Managing Director, Global Lands at Nature Conservancy. Justin is well placed to manage this process as he has spent more than 20 years championing innovation and sustainability. Not only has he worked as a Senior Advisor to the World Bank, but he served as Senior Advisor to the Duke of Westminster's new agricultural fund- Wheatsheaf Investments- where one of his initiatives was to review the value of the ecosystem on the Duke's 15,000 hectares in Spain (in terms of biodiversity).

5.1.3.1 Sub Action B3 (1i) Existing contracts for Ecosystem Services reviewed

Milestone 10- due: July 2014. Status: completed July 2014

In order to develop an effective trading platform for NaturEtrade a thorough assessment was completed of (i) the economics involved in bilateral voluntary ecosystem service provision, (ii) a literature review of existing ecosystem service schemes, and (iii) an exposition of actual ecosystem service contracts. . From this research an auction format for NaturEtrade was also proposed. This work has been consolidated in the attached report which also includes a comprehensive list of references. In addition, economist Dr Gerard Dericks actively participated in discussions and academic seminars highlighting this topic, i.e. 'The Economics of Ecosystems Services and Biodiversity – Theoretical Issues and Operational Challenges' presented by Erik Gómez-Baggethun from the Institute of Environmental Science and Technology, Autonomous University of Barcelona as well as meeting with stakeholders such as Charles Elworthy from Craigmore Farming and Jake Backus from Coca-Cola to investigate related issues such as on the area of corporate social responsibility in this context. These were key in his investigation where he factored in questions such as:

2. What is the property right being traded?
3. What is the purpose of the 'appraisal'? Physical, economic or both? How is the economic appraisal to be conducted?
4. Who are the other potential buyers of this service other than CSR and charity (private land owners)?
5. Why are stakeholders currently not purchasing these ecosystem services? How does a mapping tool and central marketplace alleviated this impediment?
6. Is there a regulation that pays for the maintenance of ecosystem services, such as a common agricultural policy? Could this be used to create such legislation?

As a result of this review, a network of ongoing dialogue has been established for the purpose of monitoring contracts which will be beneficial as the trading platform progresses. In addition, the review is still considering several examples from Vietnam, Germany and Spain which are currently being summarised by translators. This will also add value to this exploration as the project extends to Spain, Romania and Croatia. Economic research will continue to address the remaining questions surrounding the optimum design of NaturEtrade's auction format and to supplement the existing literature review with new materials as deemed appropriate.

5.1.3.1 Sub Action B3 (Iii) Review of similar web-based platforms

Not originally specified in our Milestones and Deliverables Tables. Now amended to be Milestone 10b- started July 2014, due: July 2015 to coincide with Deliverable 5. Status: ongoing.

We had originally expected that the literature review (Annex 1) would include academic discussions of similar web-based trading platforms, from which we could draw examples to inform our development of contracts and governance structures for NaturEtrade. However, as Table 1 of the literature review shows, none of the schemes examined were similar enough to our concept for NaturEtrade to be of immediate use. We will therefore broaden our search for similar platforms and use our first stakeholder meeting (September 2014) to examine possible scenarios.

5.1.3.2 Sub Action B3 (2) Governance arrangements devised

Sub-task 3 of Milestone 10 – due: July 2014. Amended to Milestone 10c- started July 2014, due: July 2015 to coincide with Deliverable 5. Status: ongoing

Governance of NaturEtrade must fulfil two criteria. First it must be financially viable, and second it must be effective in facilitating contracting while reducing the potential for disputes and dealing with them when they arise. With this in mind both internal and external governance modalities are being explored within NaturEtrade. The literature review (Annex 1) completed as *Milestone 10* incorporated a review of similar schemes that deserve attention for our final arrangements. We want to test these with stakeholders after more discussion within the team. This activity will therefore go forward as Milestone 10c (revised).

Internally NaturEtrade will look at a wide range of possible features, including the feedback mechanisms similar to eBay through which users can rate the performance of their transaction partners. External dispute resolution will almost certainly be necessary in the case of serious disagreement between parties. The most efficient structure of NaturEtrade will likely be for NaturEtrade to take on the role of a contract lawyer: being responsible for managing the issuance of a legally binding contract. It is envisaged that contracting parties will have to resort to civil courts should a dispute arise; it is highly unlikely that NaturEtrade will mediate or even offer advice in these situations, but our governance arrangements will need at least to list these possibilities in a Frequently Asked Questions section, or similar. Therefore NaturEtrade would not have any obligation or role in enforcing contracts directly. Contract law may keep changing however, and over the period of the project we made need to seek

advice from lawyers periodically to update the wording and structure of our contracts. It will be a necessary element of the After-Life plan of the project in 2018.

In the initial stages of the project, we envisage that we will need to seek legal advice (probably from within the University or amongst our stakeholders with expertise in this area and willingness to work with us on the project) to examine elements of the NaturEtrade contracts as we develop them, and certainly as we test them to advise on issues which may be causing disputes. A key function of NaturEtrade will be in verifying buyer and seller legitimacy. Land verification will be automated (*Deliverable D6*, due July 2016), but we are currently exploring the extent to which buyers and sellers can be verified remotely/automatically. Governance structure is still a work in progress and potential participants and lawyers still need to be consulted to ensure that the governance structure we propose will be attractive, feasible and legally robust.

5.1.3.3 Sub Action B3 (3) Develop and market testing of pilot contracts

Milestone 11/Deliverable 5 – due to start October 2014. Started April 2014. Due July 2015

The literature review (Annex 1) has shown which elements of the ecosystem service contract may be useful in NaturEtrade. This information will be used to consult with lawyers in the relevant jurisdictions to create contract prototypes. These prototypes will then be used to get feedback from potential users at workshops, and/or directly tested for effectiveness when NaturEtrade goes live. The review has brought to light the possibility that a contractual criterion ONLY for actual ecosystem service performance (as measured via satellite) may be suboptimal in some (possibly the majority ?) of cases, and therefore an option for action-based assessments might usefully be included in potential contracts. This finding will be evaluated at forthcoming workshops.

Next steps for Actions 2 and 3

Figure 11 summarises the steps we plan to take over the next two years to develop a functioning NaturEtrade

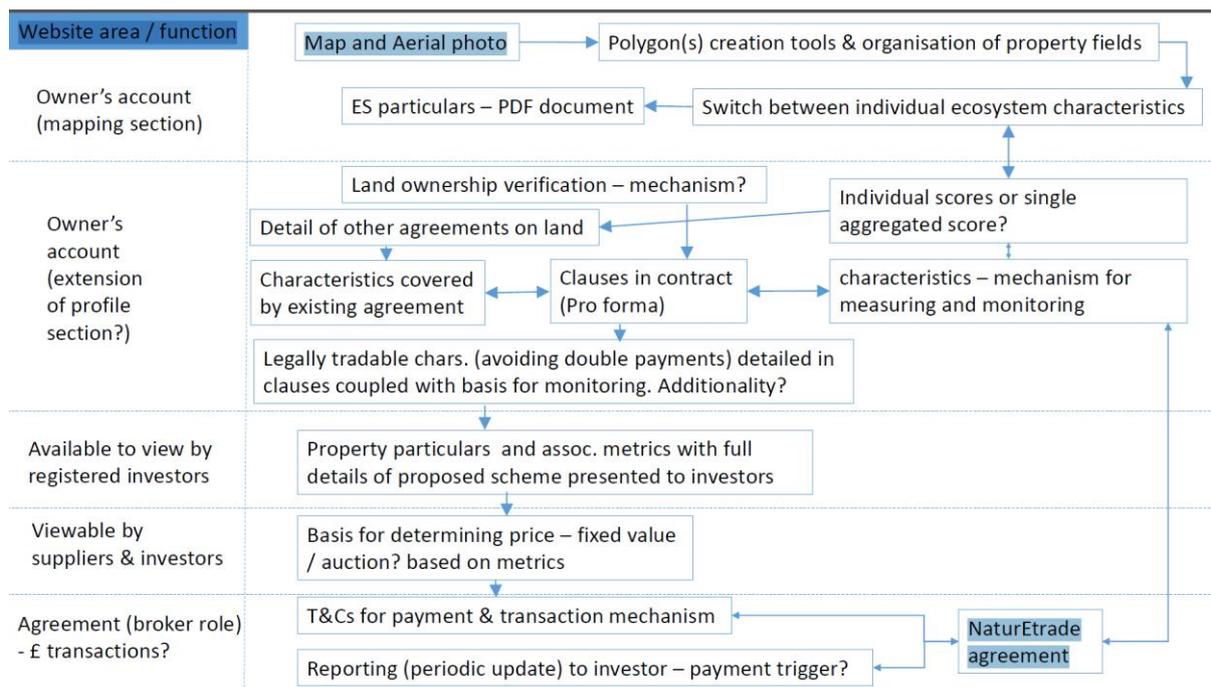


Figure 11 Next steps for Action 2 and 3.

5.1.4. Action 4: (C1: Monitoring of impact of EcoSET and NaturEtrade)

5.1.4.1 Sub Action C1 (1) Rates of land-use change determined

Milestone M13- Started Nov 2013, due: July 2015, amended July 2016

Once we have selected regions for the workshops, we will work with stakeholders there to determine baseline areas for determining historical landuse changes, and use these to assess how exposure to our LIFE+ project has improved (or otherwise) the rate of landuse change. Our original planning for this Action was unrealistic. We realise from preliminary brainstorming for our first knowledge exchange workshop in the UK the benefit of working with our stakeholders for this Action. The dates for deciding on appropriate land areas for baseline data have been adjusted to take account of dates of making contact with in-country representatives with whom we will work to run stakeholder workshops.

5.1.5. Action 5: (D1: Dissemination and communication)

Milestones and Deliverables not due to start until April 2015 (except D1 (4)). Status: we have been actively communicating the project to a wide range of organisations and individuals since receiving official approval from the EU in July 2013 (see 4.1.1.2 Stakeholder meetings).

5.1.5.4 Sub Action D1 (4) Knowledge exchange workshops run

Marked as activities, rather than Milestones, but reported here as Milestone 16 [new,]

The first knowledge exchange workshop (originally scheduled for mid-2014, was delayed until September 2014 because of our delayed project start. This preliminary workshop will

address contracts and landowner and buyers' expectations (see Actions in *B3:Standard contracts/verification tool.*) We have held brainstorming meetings with visiting academics and business people based in the Smith School of Enterprise and the Environment, and with staff and associates of the Sylva Foundation and have developed a timetable for the first workshop. A list of potential participants has been drawn up. Invitations will be sent out in early August (see Annex 2).

Milestone 16a [new - missing from original Annex 1] Identification of selected stakeholder groups and networks –at least 400 stakeholders registered on database, due: July 2014; Amended, due: July 2015. Status: to start after first stakeholder workshop (September 2014)

We have made preliminary contact with a number of stakeholder groups with whom we expect to work, during the drafting of our original project application and after receiving approval in July 2013. Our initial aim to register a large number of stakeholders on the database was overly optimistic. Internal discussions within the team revealed to us that we would need to have late-stage drafts of contracts and a greater understanding of what landowners and buyers would expect from NaturEtrade in order to register. We were acutely aware that we could undermine the success of the project if we had an incomplete database structure. This Action will therefore be delayed until after our first stakeholder meeting in September 2014.

5.2. Availability of appropriate licences and authorisations

The mapping system has been developed using the open source software OpenLayers and Open Street Map. We will potentially need licences for other providers, for example Google Maps.

5.3. Envisaged progress until next report.

All milestones are on target; deliverables D5 and D15 are expected to be on schedule. Depending on feedback from the knowledge exchange workshop, we may extend work on M2 (due end 2014) to accommodate any suggested refinement/adaption of the cultural services layer. The first knowledge exchange workshop was planned for the first half of 2014, but delayed owing to delayed start of the project, and rescheduled to September. The second knowledge exchange workshop (scheduled for first half of 2015) is anticipated to be on time.

Planned actions for next 12 months are shown in Figure 10. (A complete GANTT chart showing anticipated milestones until 2018, is included in Annex 3.

Action	Sub-Actions (Indicators of progress)	2014		2015			
		Oct	Dec	Apr	Jul	Oct	Dec
B1:Development	1 Data acquisition for ecosystem service layers						
B1:Development	2Adaptation of the ecological layers from LEFT		M2				
B1:Development	3Development of models, algorithms and datasets				M3		
B1:Development	4Automation of the EcoSET tool						
B1:Development	5Completion of GIS web-based tool (EcoSET)						
B1:Development	6Production of report detailing design of EcoSET						
B2: Creation of na	1Design and set-up of NaturEtrade website						
B2: Creation of na	2Development of mobile data capture device						
B2: Creation of na	3Development of NaturEtrade database structure						
B2: Creation of na	4Linking EcoSET and NaturEtrade						
B2: Creation of na	5Interface system linking sellers & buyers						
B2: Creation of na	6Pilot tests of NaturEtrade						
B2: Creation of na	7Modifications to NaturEtrade after feedback						
B3: Standard conti	1Existing contracts for ES reviewedM10						
B3: Standard conti	1bReview of similar web-based platforms				M10b		
B3: Standard conti	2Governance arrangements devised				M10c		
B3: Standard conti	3Develop & market testing of pilot contracts			M11	D5		
B3: Standard conti	4Contracts integrated into NaturEtrade					M12	
B3: Standard conti	5Automated land verification system developedD6						
B3: Standard conti	6Database linkage between NaturEtrade and land verification system						
C1: Monitoring of	1Rates of land-use change determined						
C1: Monitoring of	2Regions for workshops selected				M14		
C1: Monitoring of	3Workshops run in selected regionsfor landowners						
C1: Monitoring of	4Report on workshops D8						
C1: Monitoring of	5Assessment of land-use change & trading						
C1: Monitoring of	6Monitoring of social impact & equality						
C1: Monitoring of	7Monitoring success of trading and update						
D1: Disseminatio	1Web-based survey created						
D1: Disseminatio	2Articles published in relevant media outlets						
D1: Disseminatio	3Establishment of stakeholder database						
D1: Disseminatio	4Workshops run for potential buyers of ES						
D1: Disseminatio	5Knowledge exchange workshops run	M16			M17		
D1: Disseminatio	5a Identification of selected stakeholder groups and networks –at least 400 stakeh				M16a		
D1: Disseminatio	6Report on result of networking activities						
D1: Disseminatio	7Report on effectiveness of communication & dissemination activities						
D1: Disseminatio	8Regular additions to database and tool uptake						
E1: project mgt &	1Project milestones completed						
E1: project mgt &	2Project reports delieverd				D15		
E1: project mgt &	3Products running and available for use						
E2: After-life com	1Development of After-life communication plan						

Figure 12 Planned actions for the next 12 month

