



LIFE Project Number  
**<LIFE12 /UK/000473>**

## **Progress Report**

Covering the project activities from 31/07/2016 to 30/10/2017

Reporting Date  
**<15/11/2017>**

LIFE+ PROJECT NAME or Acronym  
**< NaturEtrade >**

**[Redacted version]**

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## **2. List of key-words and abbreviations**

ecosystem services (ES), payment for ecosystem services; natural capital (PES); Local Ecological Footprinting Tool (LEFT); land cover; land cover change; land classification; agri-environment measures; conservation of high value habitats; environmental stewardship

## **3. Executive summary**

### **3.1 General progress.**

The project is running approximately two years behind the original schedule in some key areas, largely because of an early decision to use an improved land cover classification system. The change was essential because the original proposal to use Corinne could never have delivered annual assessments of land cover change, which are necessary for NaturEtrade: without the ability to check how land cover has changed between two time periods separated by 12 months, it is impossible to deliver a project aimed at demonstrating capability to create a market place for ecosystem services and a cost-effective method of assessing compliance with an agreement to maintain land in a given condition as an alternative to government grants for land stewardship paid against planned stewardship activities. The novelty of our project therefore demanded that we alter this key activity and incur delays to subsequent activities. The project depends so strongly on the determination of ecosystem services derived from land cover that we were clearly unable to bring forward other actions, such as running workshops and testing baseline areas with areas exposed to NaturEtrade. For this reason we have given a very comprehensive account of Action B1, which has been subject to the extended timeline. Clearly this Action is the heart of the project so all other activities have been progressed as far as possible to ensure that once B1 is fully completed, we can put them into action (notably our Workshops and dissemination activities). We considered that there was a danger of reputational risk if we promoted the project too widely before the data could be fully interrogated throughout Europe. We took a cautious approach to exciting people about the project possibilities by demonstrating the mapping and reporting capability of the tool with real data. This was a successful strategy in the UK (for which we had working data early in the project) and resulted in collaboration requests and interest from policy makers.

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

The project will be completed on time as planned, however, with a working platform for connecting buyers and sellers of ecosystem services and working contracts that are legally sound. The project has attracted a lot of interest from the UK government as a potential monitoring tool and from landowner/manager groups in the UK and Estonia.

### **3.3 Problems encountered.**

Corinne land classification is not updated regularly and was therefore determined early to be inappropriate for NaturEtrade. This has been flagged in earlier reports, but the delay occasioned by creating our own land classification system has been brought into sharp focus as we enter the final stages of the project. We have had to push back all our Workshops, apart from early workshops in the UK testing the concepts behind NaturEtrade and receiving helpful feedback on user interface features.



## 4. Administrative part

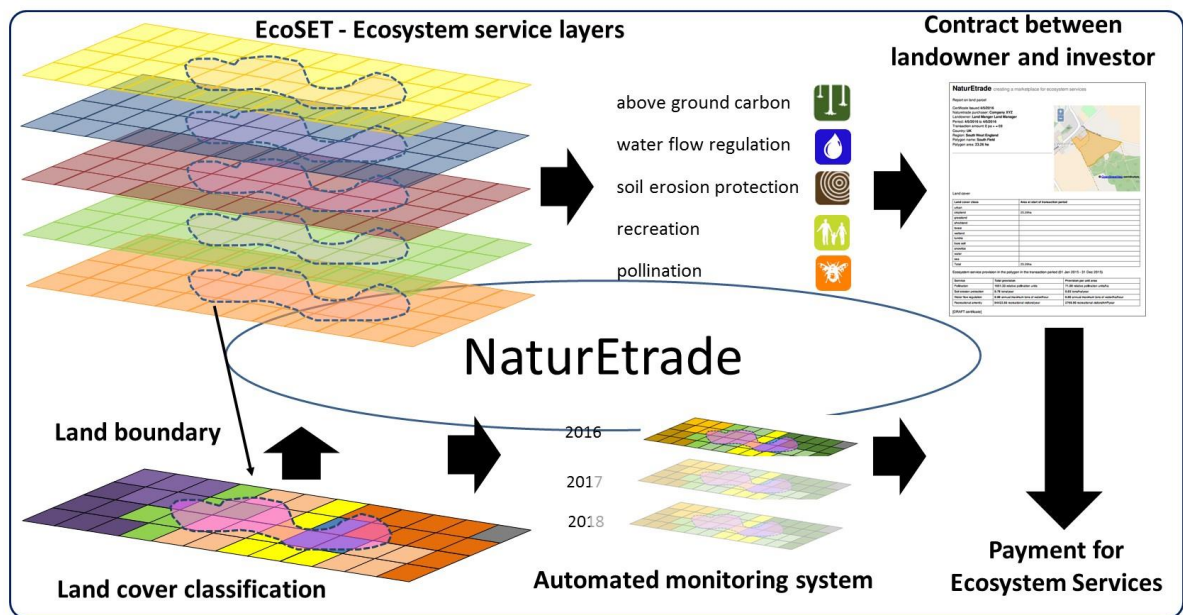


Figure 1 Components of NaturEtrade

### 4.3 Organigramme of the project team and the project management structure.

Fig 2 shows the project management structure and task organisation.

### 4.4 Reports delivered since the start of the project.

04/08/2014	Inception Report
03/08/2015	Progress Report
16/11/2016	Mid-term Report

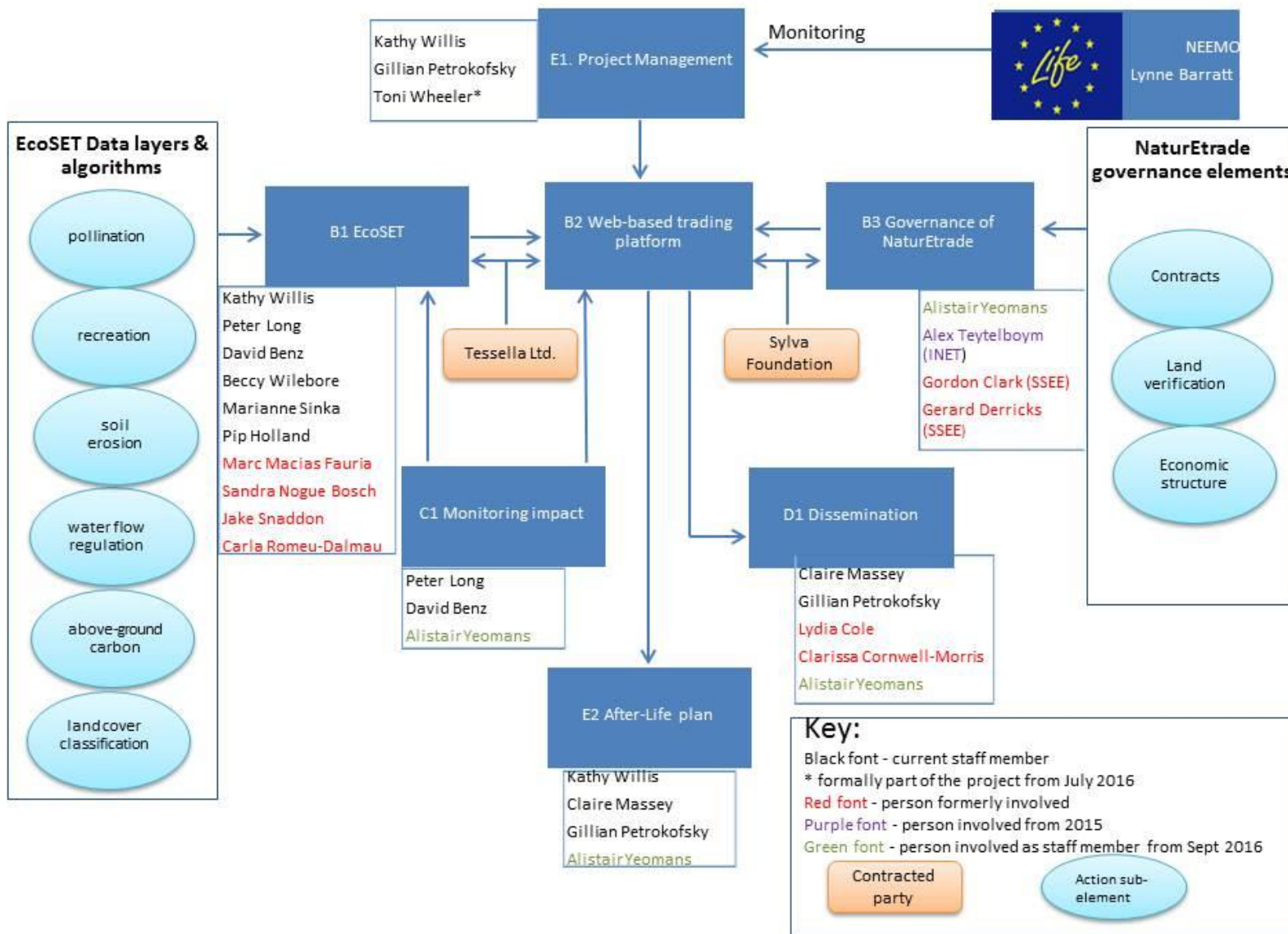


Figure 2 Organigram of NaturEtrade project

## 5. Technical part

### 5.1 Actions

For additional clarity, the numbers of the subactions relate to the GANNT provided with the Mid-Term Report, which is again appended ([Section 5.2](#)). A summary of the subactions reported in this Progress report is provided in Box 1 below.

#### Box 1. Summary of subactions – completed, ongoing, and due in Final Report

**Action B1: Development of EcoSET.** Subactions B1.1, B1.2, B1.3, and B1.6 were reported complete by the Mid-term Report (12/12/2016). Subactions B1.4 and B1.5 are reported below as Task\_1 and Task\_2. [Annex 1](#) and [Annex 2](#) provide additional detail.

**Action B2: Creation of NaturEtrade.** Subactions B2.1, B2.2, B2.3, B2.4, B2.5, and B2.7 were reported complete by Mid-term Report. Subaction B2.6 is reported below as Task\_3. Most of Action B2 and B3 were completed by the Sylva Foundation. Assessing progress and verifying accomplishments is best done by logging into the NaturEtrade site itself (<http://www.naturetrade.ox.ac.uk/>). For offline reference, however, to demonstrate value for money in the disbursement of funds for this project, [Annex 3](#) is the schedule of tasks allocated to Sylva and the time taken over the past 5 years to accomplish these (for the contracted \$125k of the contract with University of Oxford)

**Action B3: Standard contracts/verification tool.** Subactions B3.1, B3.2, and B3.6 reported complete by Mid-term Report. Subactions B3.3, B3.4, and B3.5 are reported below as Tasks 4 to 7.

**Action C1: Monitoring of impact of EcoSET & NaturEtrade.** Subactions 1-5 reported below. Subactions 6 and 7 are due on completion of the project (July 2018).

**Action D1: Dissemination and communication.** Subactions reported below. Some are partially complete (those with multiple components, e.g. Workshops for stakeholders).

**Action E1: Project management & monitoring.** Subaction E1.1 Project milestones completed (see revised GANNT ([5.2](#)), Subaction E1.2 Project reports delivered (see section 4 (above), Products running and available for use (current version of NaturEtrade is operational as demonstration tool; final version of the tool, with 2017 land use data in place will be available in April 2018 (see Action B2).

**Action E2: Development of After-life communication plan.** See [Annex 6](#).

#### 5.1.1. Task\_1: Action B1.4 - Automation of the Ecoset tool

Will be fully complete by April 2018.

The Mid-term report stated that our next step (post 12/12/2016) was to produce land cover from satellite-observed reflectance for Europe in the year 2016. The land cover feeds into the algorithms used previously, yielding 2016 ecosystem service layers. Work in the following quarter (i.e. until April 2017) would focus on downloading the remaining data for 2016, testing and applying our code to identify land cover from reflectance, and running the ecosystem service processes with the new land cover input. The remaining work would involve repeating this for the year 2017 in order to give us two data points separated by 12 months for contract verification. This work was severely disrupted by closure of our building in early Feb 2017 and failure of the servers with significant data loss (see [Annex 1](#)). The automation (i.e. code to drive the processes) has been complete since before the Mid-term report, but running the code on satellite observations and other ancillary environmental data sets is ongoing, but will be complete for 2016 and 2017 by April 2018. We put in place work-arounds for the Estonia workshop in late 2017 so that NaturEtrade could be fully demonstrated. As the two parts of this Action have involved heavy investment of time, we have provided a

very thorough account of the element of the work for measuring land cover and land cover change ([Annex 2](#)) and key points summarised here.

#### *Land cover and land cover change in EcoSET*

The backbone of EcoSET is determining land cover, from which changes over time of ecosystem services provided by given parcels of land are calculated. It is one of the layers that we have worked continuously to improve since the inception of the project. It is worth recalling that the original project proposal envisaged using Corinne land classification. This was not appropriate for NaturEtrade for reasons given below. Work on the land cover element of the project therefore extended much beyond that anticipated in the original planning documentation. Previous reports have noted this change, but without providing complete technical information. We are providing that technical detail in [Annex 2](#).

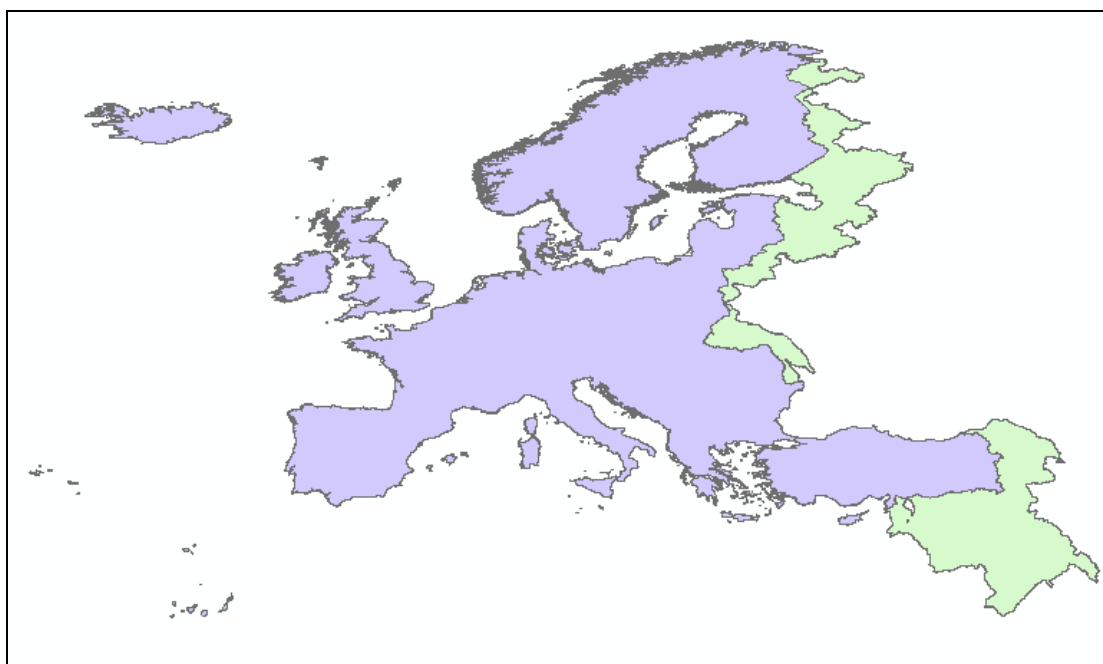
#### *Specification*

NaturEtrade requires a time-series of accurate data on the distribution of land cover classes across Europe, and data on land cover change over time. The following specifications have been identified as essential to allow NaturEtrade data to be capable of underpinning an operational marketplace for ecosystem service provision with verification of land cover change.

The following specifications are demanding and no existing data product such as Corine land cover meet the NaturEtrade land cover specifications which is why we have developed a procedure for automatic land cover classification as part of the NaturEtrade project.

#### *Extent*

In this project the required geographical extent of data coverage is shown in blue in figure 1 and detailed further in Table A1 in [Annex 2](#). Our definition of Europe is broad and includes all regions which are EU and EEA members or candidates and all areas geographically in Europe such as Kalingrad. UK, French and Dutch overseas territories are excluded. Svalbard is excluded. Additionally it is necessary to produce land cover class data for a larger area, 'Hydrological Europe' shown in blue+green in Figure 3. This area additionally includes drainage basins in Russia, Belarus, Ukraine, Moldova, Syria, Iraq and Iran which drain into Europe and over which we must run distributed hydrological models in order to produce data on the ecosystem service of water flow regulation in Europe. Land cover data and ecosystem service data for the green non-European area in Fig 2 will not be displayed or disseminated by NaturEtrade



**Figure 3 Europe (blue area) and Hydrological Europe (blue area + green area)**



### Classes

The following general land cover classes are required to be distinguished:

urban	crops
grassland	shrubland
forest	wetland
tundra	bare soil
snow\ice	water

### Spatial resolution

In order to provide data at a scale relevant to individual landowners, land cover class and ecosystem service provision need to be mapped at 30m (1 arcsecond) resolution.

### Temporal resolution and production schedule

Land cover class data is to be produced using satellite observations collected over a period of one year (in order to characterise seasonality). A new land cover map is required to be produced every 3 months, using satellite observations from the antecedent 12 months (see Table 2 for example schedule). Seasons are defined as follows: the period Dec, Jan, Feb is winter; Mar, Apr, May is spring, Jun, Jul, Aug is summer, Sep, Oct, Nov is autumn. A land cover map should use satellite data from all seasons i.e. collected over a period of 12 months. This definition of seasons dictates the dates of temporal support of the land cover and land cover change maps. This means that each land cover map (and estimates of the provision of ecosystem services) represents the situation as of a particular date each year (31<sup>st</sup> Nov, 28<sup>th</sup> Feb, 30<sup>th</sup> May, 31<sup>st</sup> Aug) taking account of seasonality during the antecedent year.

There is necessarily a time lag for data processing between the acquisition of the last relevant satellite observation to be used in production of a given land cover map, and the availability of the maps to NaturEtrade users (see Table 3). When the NaturEtrade processing system is fully operational, this lag will be 1 month. This schedule for the availability of land cover and land cover change data dictates when information can be provided to buyers and sellers in the NaturEtrade marketplace. Data will be available on 1<sup>st</sup> Jan, 1<sup>st</sup> Apr, 1<sup>st</sup> Jul, 1<sup>st</sup> Oct each year. This means that NaturEtrade contracts will pertain to periods which must start on one of those dates.

Production of land cover change maps (delta classification) requires two independent land cover class maps: a land cover classification (at t2) based on the most recent 12 months of satellite data is compared to a land cover classification (at t1) based on an independent (non-overlapping) period of 12 months of satellite observations immediately prior to the period used to make the t2 classification. First, a map of all land cover transition classes at t2 is produced. Second this is reclassified to produce a map at t2 of land cover change (0/1) i.e. unchanged land cover and changed land cover.

**Table 1 - example production schedule**

Satellite observations acquired	Land cover map temporal support	Land cover data available	Land cover change temporal support Change between	Land cover change data available
Mar 2017 - Feb 2018	Land cover as of 28 Feb 2018	1 Apr 2018	t1 (Mar 2017-Feb 2018) and t2 (Mar 2016-Feb 2017)	1 Apr 2018
Dec 2016 - Nov 2017	Land cover as of 31 Nov 2017	1 Jan 2018	t1 (Dec2015-Nov2016) and t2 (Dec2016-Nov 2017)	1 Jan 2018
...	...	...	...	...

### *Temporary placeholder land cover data*

We wanted the development of the processing algorithms for ecosystem service provision to proceed in parallel with development of the NaturEtrade land cover classification system. In order to allow work on the ecosystem service algorithms and NaturEtrade web mapping interface to proceed, we initially used some temporary placeholder land cover data. We used the Globeland 30 (National Geomatics Centre of China 2014) product as a preliminary land cover map. This product has the same 10 classes as the NaturEtrade land cover classification, has 30m spatial resolution, the temporal support of the map is the year 2010 and users' accuracy = 0.85. This placeholder data will be substituted with the NaturEtrade land cover data once the processing system has produced contemporary land cover data for Europe.

### *Satellite data*

The NaturEtrade land cover classification procedure uses all granules of Landsat 7 ETM and Landsat 8 OLI+TIRS data which intersect the NaturEtrade extent (figure 1) during the period of temporal support for the map to be produced. These granules are documented in a metadata database available from USGS and are organised by WRS-2 footprints. The Landsat sensors produce data at 30m resolution over a ~185km wide swath in six reflective bands and one thermal band. The 15m Landsat panchromatic band is not used in the NaturEtrade land cover classification procedure. Each Landsat satellite has a temporal resolution of 16 days. These sensors have excellent radiometric calibration, geolocation and band to band co-registration.

### *Satellite data processing*

The USGS Landsat metadata database is used to select and bulk order the processing of the required granules by the USGS ESPA system. ESPA runs the LEDAPS (for Landsat 7) and L8SR (for Landsat 8) software libraries which allows us to request the following processing be applied to each granule of Landsat 7 and Landsat 8 data before it is bulk downloaded:

- i) project Landsat granules from utm to latlong;
- ii) atmospheric correction to surface reflectance and land surface temperature
- iii) cloud and other QA information using FMASK to identify valid surface observations.

After downloading all the relevant ESPA pre-processed Landsat 7 and Landsat 8 granules for a particular time period, the reflectance and temperature data are split into one-degree tiles and the QA information is used to identify pixels which are valid surface looks and mask cloudy observations as no-data. Valid observations of surface reflectance for each band and land surface temperature are then used to calculate some derived satellite observables (NDVI, NDSI, NDBSI, Brightness, Visible) for valid pixels.

Next, for a given 12-month time period, and for each one-degree tile, all valid pixels of each satellite observable are temporally aggregated to calculate the annual medians, annual 1<sup>st</sup> quartiles and annual 3<sup>rd</sup> quartiles for each observable from all valid observations.

Finally, a texture metric is calculated from annual mean Brightness surface reflectance.

### *Biogeographic regions*

Classifiers are developed for each land cover class taking account of the annual satellite observables and European Biogeographic Region identity (European Environment Agency 2002). The following regions are considered: Alpine, Atlantic, Black Sea, Boreal, Continental, Macaronesian, Mediterranean, Pannonian, Steppic, Anatolian, Arctic. This is important because a land cover class such as forest may be spectrally different between regions.

The European biogeographic regions shapefile is used for stratification in developing the ground reference data, and is also used as a categorical covariate in the land cover classification.

## *Ground reference data*

Open Street Map (Ramm et al 2011) is used as a source of time-explicit ground reference data on land cover. The planet.osm database file is regularly downloaded and spatially subset to Europe. Then selected data themes are converted to shapefiles. NaturEtrade makes use of OSM line features for coastlines and polygon features including administrative areas, buildings, land cover, water bodies, and natural.

## *Accuracy*

Users' accuracy of the land cover class maps should be as high as possible, and greater than 0.90.

Knowing the accuracy of each land cover map is data products is fundamental to the land cover verification system in NaturEtrade, and this is explained fully in Box 2.

### **Box 2 the land verification system and the importance of having known (and as high as possible) users' accuracies of land cover data and land cover change (0/1) data**

The NaturEtrade land verification system must determine if land cover has occurred within a polygon subject to a contract during the period of the contract by comparing land cover prior to the start of the contract (t1) with land cover at the end of the contract (t2), recognising that contracts may pertain to periods of 1 year starting at 3-month intervals (on 1<sup>st</sup> Jan, 1<sup>st</sup> Apr, 1<sup>st</sup> Jul, or 1<sup>st</sup> Oct)

This is accomplished by making a land cover classification at t1 and t2, and making a map of land cover transition classes at t2 (reflecting changes between t1 and t2).

The number of possible transition classes between two time points is the square of the number of land cover classes which are mapped at each time point. In NaturEtrade the classifier distinguishes 10 land cover classes, so there are 100 possible transition classes.

From the t1 and t2 land cover maps we can make a map of transition classes at t2 (e.g. forest persistence, forest conversion to bare soil etc) and it is possible to zonally count how many pixels are in each transition class within a polygon.

These counts can be expressed as a transition matrix. Columns represent classes at t1, rows represent classes at t2. Counts in the elements of the matrix are frequencies of pixels in the polygon in each possible transition class contingency between time 1 and time 2. Ideally the counts in the diagonal elements (representing persistence of each class during the period) will be high and the counts on the off-diagonal elements (representing change from a class to a different class) will be 0.

The map of land cover transition classes is hardened by reclassification to two levels: pixels which persisted in the same land cover class from t1-t2 (which take values of 0); and pixels which changed class from t1-t2 (which take values of 1). This is the land cover change (0/1) map at t2.

If the land cover classifier had a users' accuracy of 1, then the land verification system would simply have to determine if the zonal mean of the land cover change (0/1) was equal to 0, in which case the land owner would have complied with the contract, or >0 in which case the land owner would have allowed land cover change to occur and not complied with the contract.

Unfortunately, since it is impossible to build a perfectly accurate land cover classification system, it is necessary to identify a threshold to determine from the zonal mean of the t2 land cover change (0/1) map whether or not land cover change has occurred, taking account of classification error.

There will be errors in the t2 land cover change (0/1) map (both type I and type II) due to errors in the classification procedure. In other words, we can think that a pixel has persisted in one class when it has actually changed, or we can think that a pixel has changed when it has actually persisted.

The land verification system uses a threshold for the zonal mean of the t2 land cover change (0/1) map which is the complement of the land cover users' accuracy squared. E.g. if the users' accuracy for the land cover classification is 0.90, then the threshold would be  $1 - (0.90*0.90) = 0.19$ .

*Summary and next steps towards project completion for Action B1.4*

Table 2 summarises the elements discussed above (and in more detail in [Annex 2](#)) and provides a timetable for completion.

**Table 2 EcoSET & land cover change data summary**

	What the service indicates	Units	Operational area as of Dec 2017	Operational area as of Apr 2018
Land cover	Extent of land in 10 classes (urban, crops, grassland, shrubland, forest, wetland, tundra, bare soil, snow\ice, water), high accuracy (k>0.9), resolution 30m.	Category; area per class	British Isles 2016 (& comparative 2010 land cover data); Estonia – 2016	Europe 2016 + 2017
Land cover change	Land cover at 2 time periods compared	As above	British Isles 2016 (& comparative 2010 land cover data); Estonia – 2016	Europe 2017 vs 2016
Ecosystem service				
Pollination	The service of crop pollination is defined as the degree to which a patch of land provides nesting habitat for pollinators within foraging range of pollination dependent crops.	relative pollination units	British Isles 2016 (& comparative 2010 land cover data); Estonia – 2016	Europe 2017 vs 2016
Soil erosion	The service of soil erosion protection is defined as the amount of avoided soil erosion from a patch of land as a result of the land cover class (trees, crops, etc.) compared to how much soil would be eroded at this location if the land cover were bare soil.	tons averted soil erosion/ hectare/year	British Isles 2016 (& comparative 2010 land cover data); Estonia – 2016	Europe 2017 vs 2016
Water regulation	The service of water flow regulation is defined as as the maximum amount of runoff from a patch of land with a particular land cover class which was averted because of the land cover.	annual maximum tons water/ hectare/hour of runoff averted	British Isles 2016 (& comparative 2010 land cover data); Estonia – 2016	Europe 2017 vs 2016

Carbon	The service of carbon stored in above-ground biomass is the estimated number of tons of carbon in each hectare stored in vegetation.	tons carbon/hectare	British Isles 2016 (& comparative 2010 land cover data); Estonia – 2016	Europe 2017 vs 2016
Recreation	The service of recreational amenity is defined as the area normalised estimated number of people visiting a location per year.	visitors/km2/year	British Isles 2016 (& comparative 2010 land cover data); Estonia – 2016	Europe 2017 vs 2016

### ***5.1.2 Task\_2: Action B1.5 – Completion of EcoSET***

Will be completed by April 2018 once new land cover data are read into the system (see above), the tool will be working with the most up-to-date data. The demonstration data are in place meanwhile (these were demonstrated to the EC Joint Mission on Nov 22 2016) and have been used at stakeholder meetings in the UK and Estonia (see below) to demonstrate the project's aims very clearly. The system architecture is all in place to read updated ES and land cover data, which will be a requirement of the After-Life of this project, ensuring regular inputs of current data at least quarterly.

### ***5.1.3 Task\_3: Action B2.6 Pilot tests of NaturEtrade***

Will be completed by May 2018. UK data have been pilot tested at UK stakeholder meetings (previously reported), and in December 2017, Estonian data were pilot tested at a stakeholder meeting in Tallinn (reported fully under Action D1). The land managers and others present at the meeting drew polygons around land parcels with which they were familiar and were impressed by the accuracy of the information presented to them automatically from NaturEtrade. No additional design alterations were suggested for the tool. Pilot tests will be done in the two remaining workshops in Spain (see below) and Romania in April or May 2018, but we are confident that the tool works well and interprets the land cover and ecosystem service data accurately.

### ***5.1.4 Task\_4: Action B2.7 Modifications to NaturEtrade after feedback.***

Completed Dec 2017. We will not make further significant modifications to the website or the underlying data-reading architecture. Minor clarifications to information on the website will be possible following feedback if any emerge at the two remaining workshops, but no major changes are now necessary to the tool.

### ***5.1.5 Task\_5: Action B3.3 Develop and market test pilot contracts***

Completed December 2017. The planned testing of contracts with buyers and sellers in Surrey as part of their Ecosystem Services plan for the county was cancelled owing to the Tinbergen closure ([Annex 1](#)) and subsequent serious disruption. The draft contracts have been developed with the guidance of University of Oxford legal services and are considered to be suitable for the After Life of the project ([Annex 4](#)). We ran a workshop with one of the largest property partnerships in the UK (managing over 800,000 hectares for some 500 rural estates) to test the near-final version of NaturEtrade. Two contrasting estates were worked through in this particular session. Users were encouraged to map their own properties, or properties they know well to emphasise that though NaturEtrade is a Demonstration project, it is demonstrating real capability of assessing changes in ecosystem services over time and enabling a market to develop for buyers keen to sponsor 'no-change'. Feedback from this session with potential users resulted in minor modifications, mainly clarifications for registering with the system. A suggestion was made to create a YouTube type video explaining registration and functionality of NaturEtrade. A draft version of this was made in January 2018 and will be uploaded onto the website.

### **Figure 4 Workshop with land agents Strutt and Parker testing contracts and functionality**

The Estonian stakeholders were also happy with the format of the contract. Major changes are not envisaged, though feedback will be welcomed at the remaining two workshops.

### ***5.1.6 Task\_6: Action B3.4 Contracts integrated into NaturEtrade***

Completed December 2017. The contract is generated once a 'buyer' selects a property to sponsor automatically. This work has involved the website developer in the Sylva Foundation creating the mechanism for comparing two time points of data generated from the servers in Oxford and enabling an expression of 'no change' to be created at time point 2, which signals contract completion. Discussion has ensued at stakeholder workshops about the apparently counter-intuitive failure of a

contract in the event of land having been ‘improved’. While recognising that this is a natural development for NaturEtrade, we have been clear that our project is measuring lack of change. This avoids judgements about what land use changes are ‘positive’ and conforms to our principal objective of preventing loss of biodiversity (and by extension Ecosystem Services) in Europe. Sellers can put their land parcels back into NaturEtrade at higher prices as land improves, so the system encourages long-term improvement and is not in fact an illogical bar to improvement. We feel this is an important difference from existing payment systems which pay for specific short-term land improvement, whose continuance cannot be guaranteed once the payment has been made. NaturEtrade’s business model allows for step-wise improvement that attracts higher sponsorship every 12 months.

#### ***5.1.7 Task\_7: Action B3.5 Automated land verification system developed.***

Payment is set up to be triggered by assessment at Time 2 (Time 1 is start of project; Time 2 is 12 months later). This has been demonstrated for 2016 vs 2012 data and will be able to be demonstrated with 2017 vs 2016 data by April 2018. The software is all in place to read the data sets once these are finished. See also [Annex 2](#) for more detail of the work involved.

#### ***5.1.8 Task\_8: Action C1.1: Rates of land use change determined***

To establish historic rates of change between land cover classes, we will download satellite observables and perform a land cover classification for the years 2001, 2006, and 2011, using the same methodology as the ongoing classification we will use to establish land cover changes in B1 (see above). This task was originally conceived as a way of providing a counterfactual for assessing land that was registered in NaturEtrade and providing proof that the project ‘works’. However, it became increasingly clear as the project progressed that this vision of holding back loss of ecosystem services in Europe was somewhat utopian and we have interpreted this action as developing a system that has capability of enabling transactions that ‘offset’ opportunity costs of activities that lead to land-use change, and which can be used to compare the land parcels of these incentivised landowners with counterfactual parcels of land for which we calculate the effects of historical land-use change on our five ecosystem services. Our project demonstrates a tool that can be used for such monitoring activities and we can compare land parcels in real time with historic trends of ES losses in precisely the way we described in this action originally, but without being able to state that the trading element has caused a reduction in detrimental land-use change. Crucially, the original proposal suggested using Corinne land cover classification and for reasons given above, we had to develop an in-house classification that could be run at regular intervals in order to compare land parcels in real time over 12-month intervals. This has meant a great deal more development time spent on Actions for B1 (as described in detail above and in [Annex 2](#)) and has pushed the workshops back into 2017 and 2018. There is insufficient time now to measure the outcomes of participating in NaturEtrade for one year compared with neighbouring farms or land. Given that the project was conceived as a demonstration project and there would never be any trading with cash payments, we also feel it is important to stress that we have set about this Action to demonstrate the capability of the project. We would ask the EC to view our progress on this Action and subsequent measures of success in that light.

#### ***5.1.9 Task\_9: Action C1 (2) Regions for workshops selected***

We had originally selected our regions for workshops in the UK, Romania, Spain and Croatia. We subsequently substituted Tallinn, Estonia for Croatia, with approval from our project Monitor for reasons of (a) cost (the Estonians offered to pay all our expenses for the workshop, including travel), and (b) two of our original key contacts in Croatia relocated to Finland and were not able to help arrange a Croatia meeting readily. Our planned workshop in Catalunya, Spain would also be best moved to Portugal for similar reasons of change of key contacts and a willing local partner near Lisbon, Portugal who has a wide network of agricultural and horticultural land owners. The workshop in Mures, Romania scheduled now for spring 2018 will remain as originally planned.



### **5.1.10 Task\_10\_Action C1 (3) Workshops run in selected regions for landowners**

Subsequent to the Mid-term report, we ran a stakeholder workshop in Estonia at the Ministry of the Environment in Tallinn on 7th and 8th December 2017 for some 30 invited people with an interest in ecosystem services and land cover change from the Environment Ministry and its agencies as well as NGOs, private forestry company representatives, land owner representative groups, and academics. Details of attendees and programme are in [Annex 5](#).



**Figure 5 Estonia stakeholder workshop**

### **5.1.11 Task\_11: Action C1 (4) Report on Workshops**

See [Annex 5](#)

### **5.1.12 Task\_12: Action C1 (5) Assessment of land-use change and trading**

See 5.1.8 above for reasons why this action has been interpreted as demonstration of a system that would allow transactions to ‘offset’ the opportunity cost of actions leading to land-use change. assess land-use change. We have at each of our workshops demonstrated capability of the tool to be used for incentivising landowners and managers to participate in a fully functioning NaturEtrade. Similarly with meetings with Thames Water, Strutt & Parker and Surrey Wildlife Trust, we have demonstrated how the tool would contribute to business a range of objectives, including Corporate Social Responsibility and protection of key assets, and have received positive feedback. While the project remains in demonstration mode, we cannot assess ‘success’ of the project along the lines envisaged in the original project. We think the project has received sufficient approval by the wide range of people to whom we have demonstrated it, that we have planned for After-Life projects to build on the demonstration model and take the ideas into practice. The originally-conceived assessment metrics would be key to success of an operational phase.

### **5.1.13 Task\_13: Action D1 (1): Web-based survey created.**

Originally conceived as a way of obtaining feedback on the ease of use of EcoSET and NaturEtrade, once we recognised that no existing data product, such as Corine (specified in our original proposal) land cover meet the NaturEtrade land cover specifications and took the necessary decision to develop a procedure for automatic land cover classification as part of the NaturEtrade project, and recognising that this pushed our timetable back considerably, we felt that face-to-face meetings with land owners and managers would provide us with more robust feedback. We intent to launch a simple online survey to invite a wide range of people to use the finished NaturEtrade demonstration tool in April-

May 2018. This will be promoted through networks cited in the proposal, and others we have been in contact with during the progress of the project.

Box 3 shows the key organisations and networks we will contact to invite participation in the survey. The survey will be created in Limesurvey, which allows for instructs to be multi-lingual, though the questions in the survey itself will be in English. Explanations of the project in the form of semi-popular articles will be written to accompany the survey (see also Task 14 below).

### **Box 3 – organisations to disseminate online survey**

European Landowners' Organization  
Union of Foresters of Southern Europe  
International Union of Forest Research Organizations (not in original project, but has wide European reach)  
ARCMED  
Asociata Proprietarilor de Paduri din Romania (APPR)  
Country Land & Business Association  
Scottish Land & Estates  
Sihtasutus Erametsakeskus (Foundation Private Forest Centre, Estonia)  
European Forest Institute  
Instituto Superior de Agronomia, Lisbon

#### ***5.1.14 Task\_14: Action D1 (2): Articles published in relevant media outlets***

See Task 13. We have produced easy-access documentation of the aims of the project for stakeholder workshops and to interest potential partners during the course of the project. Once the land cover data are in place for 2017, we will send versions of these semi-popular semi-technical accounts to relevant media read by land owners, managers and decision-makers.

***5.1.15 Task\_15: Action D1 (3): Establishment of stakeholder database. Reported established in Mid-term Report; work ongoing as we add stakeholders to the database.***

#### ***5.1.16 Task\_16: Action D1 (4): Workshops run for potential buyers.***

We have run buyers and sellers workshops all together in UK, Estonia and plan to do the same in Spain (or Portugal, more likely) and Romania. Our decision was based on the belief, backed up by feedback from collaborators who recommend bringing the two communities together to understand the needs of different types of stakeholder and attempt to position our tool in that discussion space.

#### ***5.1.17 Task\_17: Action D1 (5): Knowledge exchange workshops run and attended***

(a) Peter Long attended the NaturEtrade at LIFE platform meeting on ecosystem services, Estonia, 10 May, 2017 to give a plenary talk at the 'LIFE platform meeting on ecosystem services', Tallinn, Estonia on 10th May 2017. This was an opportunity to share our experience of developing a scalable web-based system for mapping ecosystem services with representatives from 50 other LIFE projects from across Europe. There was also extensive discussion of how the degree to which LIFE project enhance ecosystem service provision could be monitored and evaluated.

<http://ec.europa.eu/environment/life/news/newsarchive2017/june/index.htm#ecosystems>

(b) Hosted a delegation from Greece to exchange knowledge and discuss future collaboration.

Dr Gillian Petrokofsky, Dr Beccy Wilebore and Alistair Yeomans provided an overview of the NaturEtrade project which was followed by a discussion on the principles of PES and if such an approach as NaturEtrade could work in Greece. The Greek Task Force (George Protopapas, Kellie Koligiogas, Dr Katerina Koutsovoulou and Dimitris Chomatidis) then provided a summary of their work in Greece. About the [Greek Task Force for the LIFE Programme](#).



The GR-LTF falls within the LIFE Capacity Building Program and will run from 01/01/2016 to 30/04/2019. Coordinating beneficiary of the project is the Green Fund and associate beneficiary the Ministry of Environment and Energy. The project will be coordinated by George Protopapas, who is the National Contact Point for the LIFE Programme. The aim of the project is to strengthen the National Contact Points for the LIFE Programme, for the effective participation of Greece in LIFE projects, in order to promote environmental and climate policy through integrated projects. In order to meet the Project's needs, a LIFE Task Force of 5 dedicated officers has been established:

Nature/Biodiversity Officer; Environmental Officer; Climate Change Officer; Data Management/GIS Officer; Environmental Communication Officer

LIFE Task Force will provide relevant know how, assistance and consultation to potential LIFE stakeholders and beneficiaries, at the national, regional and local level, enhancing collaboration among authorities and stakeholders, organizing meetings and workshops at the national and regional level, providing technical assistance for integrated projects, promoting the cooperation in international project proposals and the involvement of the private sector in co-financing of projects.

Moreover, LIFE Task Force will provide assistance to public services, municipalities and the competent authorities, for the coordination and financial management of LIFE projects, in order to enhance their capacity and effectiveness in project implementation.

It is the first time that a department, adequately staffed, will deal with LIFE Programme issues in Greece.

**5.1.18 Task\_18: Action D1 (6): Report on result of networking activities**

Networking has been reported under News on the website (<http://www.naturetrade.ox.ac.uk/news>). See [Annex 6](#).

**5.1.19 Task\_19: Action D1 (7): Report on effectiveness of communication & dissemination activities.** Formal report to be submitted with Final report.

**5.1.20 Task\_20: Action D1 (8): Regular additions to database and tool uptake**

See Actions B1, B2 and C1 above.

**5.1.21 Task\_21: Action E1(1) Project milestones completed**

(see revised GANTT (Section [5.2](#)))

### **5.1.22 Task\_22: Action E1(2) Project reports delivered**

(see Section [4.4](#))

### **5.1.23 Task\_23: Action E1(3) Products running and available for use**

The current version of NaturEtrade is operational as a demonstration tool; the final version of the tool, with 2017 and 2016 land use data in place, will be available in April 2018 (see Action B2).

### **5.1.24 Task\_24: Action E2: Development of After-life communication plan.**

See [Annex 7](#)

## **5.2 Envisaged progress until next report.**

The project will be completed by July 2018 as envisaged. Individual actions are reported above and where planned outcomes have been altered or will not be delivered as originally conceived, the reasons are given in the report on actions. The revised Gantt chart (Fig 6) shows progress to final completion and amendments since project inception.

## **5.3 Impact:**

The measurable impacts of this project will be reported following the concerted dissemination activities planned following completion of the most up-to-date land cover and ecosystem service data (April 2018) and the last two workshops in Romania and Spain (or Portugal).

## **5.4 Outside LIFE:**

The LEFT tool was relaunched with an updated software architecture and a revised business model (<https://www.left.ox.ac.uk/>) that enabled users to download reports free, but pay for data. The registered users of LEFT are considered to be part of our database of potential users of NaturEtrade and will be invited to register and use NaturEtrade in April 2018. We get approx. 30 visitors a week (excluding those who bounce out immediately) and have almost 500 registered regular users. The majority are in Europe and therefore well-matched potential users of NaturEtrade. Interestingly, Google Analytics records that just over 48% of LEFT visitors/users are identified as female. This is encouraging from the perspective of inclusivity in NaturEtrade when that is opened to wider activity.