European Long-Term Ecosystem and Socio-Ecological Research Infrastructure PLUS

TA-RA Scheme

(Transnational and Remote Access)

Reference document for
project applicants (users)
and site managers

September 2020

Purpose

This reference document describes the specifics of the eLTER TA-RA Scheme in detail, that is, beyond the overview provided on the project website It outlines the operational and administrative processes set up to successfully run the programme. It also provides complete transparency to all parties involved in the scheme.

Potential users are kindly requested to familiarise themselves with the opportunities, requirements and criteria that go along with their applications and possible subsequent projects. Likewise, site managers are kindly requested to familiarise themselves with the process steps of project internal TA-RA administration. Both is a prerequisite for a smooth operation of the scheme for a mutual benefit of access providers and users.

Furthermore, for site managers, a separate document "eLTER PLUS TA-RA Administration for Site Managers" is provided which contains details related to the Commission H2020 and eLTER PLUS project internal processes.

Contents

Transnational Access (TA) and Remote Access (RA) within eLTER PLUS

eLTER PLUS offers free-of-charge opportunities for multi-national teams of researchers or for individual researchers to perform research at selected sites for the purpose of small to medium scale ecological and socio-ecological projects. The scheme will support both single-site and preferably multiple-site (i.e. requiring co-ordinated work and data synthesis across two or more sites) research projects. Funding provided to user-groups or individual researchers for projects will be awarded on a competitive basis.

Through its access scheme, eLTER PLUS opens up the eLTER Research Infrastructure (eLTER RI) and intends to attract a wide range of users, primarily from outside of the consortium. The eLTER PLUS access scheme contributes to the generation of new data which shall be made available widely and openly.

All sites included in the eLTER PLUS TA and RA Scheme are equipped with state-of-the-art instrumentation to enable comprehensive ecological measurement and experimental campaigns. Likewise, state-of-the-art socio-economic research is conducted at several of them. IT-facilities are provided for data upload, storage and processing. The sites were selected to represent all biogeographic zones of the continent and they are described at the eLTER PLUS website and in the eLTER Site Catalogue.

TA refers to in-person, physical, hands-on work by users at one or more of the LTER sites involved in the scheme, whereas RA refers to protocols regarding measurements, data collection, and possibly experiments defined by users and performed on their behalf by site staff.

eLTER PLUS also offers Virtual Access (VA) to its data. Although the three access modes by eLTER PLUS are interrelated, the process how VA is performed is entirely different from the one regarding TA and RA. It is, thus, not subject of the present document. Nevertheless, eLTER PLUS TA-RA users are advised to also consider VA data as a supplement to their studies.

These three modes are summarised in the below table.

Overview of eLTER access modes

This document relates to the operational aspects of transnational and remote access. Nevertheless, Virtual access is also mentioned in this table for reference and for reasons of completeness.

	Transnational access	Remote access	Virtual access
Role of users	Users perform their own on-site measurements or experiments	Users define protocols for measurements and experiments to be performed at the site(s) by local staff	Users download data from the eLTER DIP (Data Integration Platform)
Role of site staff	Explains the facilities and supervises and supports users' activities	Perform work on the users' behalf and sends results and, if needed, specimens to the users	Ensure that data are accessible to users, e.g. by producing a data file and uploading it to a cloud server
Related travel	Users or teams of users visit site(s) in person, site staff is (partly) present	Users do not travel, site staff is present at the site	Users do not travel, nor does site staff
Funding needed*	Travel costs of users and of site staff, working time of site staff	Travel costs and working time of site staff	Working time of site staff

)* see "Financial Support" below

Top-down and bottom-up approach

The calls for proposals encompass both a top-down and a bottom-up component:

For the top-down component, a set of pre-defined research questions is provided regarding the following thematic categories:

- Drivers, trends and states of biodiversity
- Carbon and nitrogen cycling in ecosystems
- Water stress in ecosystems
- Socio-ecology

Proposers may address one or more of our recommended research questions within this framework. These questions are listed in Annex 1. Through this top-down component with pre-defined scientific frameworks for the user projects, ongoing eLTER work relating to urgent research challenges shall be supported and widened.

Likewise, for the bottom-up component, users are encouraged to define their own research questions and thereby demonstrate further options to utilise the eLTER Research Infrastructure. Through this bottom-up component, new and additional users shall be linked to eLTER

and novel scientific applications shall be enabled and collaboration within and beyond the eLTER community shall be enlarged.

Thus, both components are considered equally important. In either case, education will be fostered to strengthen the next generation of eLTER researchers. Experiences made in the predecessor-project have shown that the eLTER access scheme is very suitable to support graduate students who conduct such studies as part of their thesis work.

The below figure illustrates this combined approach.

Bottom up

User defined topics (in line with eLTER goals)

Educational

Users perform work, e.g. thesis-related, as part of a larger undertaking

Top down

Users work within pre-defined frameworks

Commission access related rules

Calls timing: Issued September– Deadline November – Evaluation outcome February – Projects start April or later
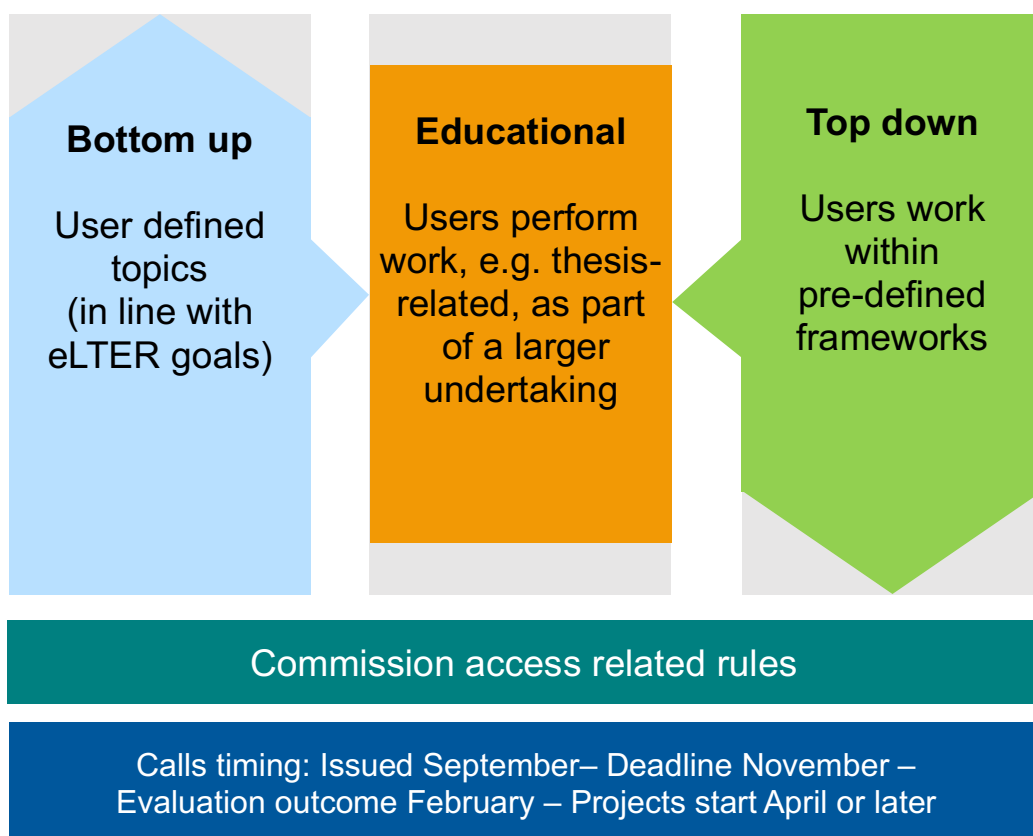
Overview of the eLTER PLUS access approach

Support offered

Technical/scientific support for TA

Supervision and training: Users will be introduced to the site, the scientific questions it addresses, its ongoing operations and the existing instrumentation. They will receive access to past data and scientific results from the permanent monitoring programmes. Site personnel will provide training to use the site's facilities and instruments, and also any supervision needed for the users' preparatory work.

Use of instrumentation: Users may take part in all ongoing routine measurements. Likewise, jointly with site personnel, particular measurement activities may be specifically set up for the users' own research. Users may also bring and use their own instruments, subject to the prior consent of the site owner.

Performing technical/scientific work for RA

Users will receive detailed information about the site and its opportunities and interact with site staff remotely through electronic media including teleconferencing. During the RA project, site staff will perform the work agreed with the selected users. The outcomes, that is data and observations, and, if needed, specimens, will be made available or sent, respectively, to the users.

Combination of TA and RA

eLTER PLUS encourages the users to combine TA and RA related project work. Thereby, users could hands-on test and refine a protocol they developed at one site, and thereafter have the same protocol performed at other sites remotely. In this way, the advantages of both approaches can be combined. TA enables physically visiting a site and gaining practical experiences by performing own research related work. It also provides the benefits of face-to-face interaction with and supervision by site staff. Whereas, RA enables the continuation of the work and a geographical upscaling in an environment-friendly and economically viable manner through remote work without travel. In this way, the added value of the network can efficiently be demonstrated as opposed to single-site research.

Financial support

Free of charge access: Users selected to benefit from the eLTER PLUS Access Scheme will not be charged, and can thus enjoy free access to the site(s) and all the services provided to them during TA and/or RA. Instead, the eLTER PLUS project will reimburse the eligible costs incurred by the site's host organisations as unit costs or actual costs as agreed in the project Grant Agreement.

Cost reimbursement for users: For site visits, users will receive reimbursement of least-cost travel expenses to, from and within the site. Private or rental car travel will be supported if travel by public transportation is not possible. If possible, on-site accommodation and/or on-site meals will be offered at no cost to the users. If not, the costs of reasonable accommodation in the vicinity of the site will be reimbursed and costs for food as well (see subsistence rates). Site staff will assist users in finding suitable accommodation in the vicinity of the site.

Central and de-central cost reimbursement: Costs for users will exclusively be covered by the site host organisations, that is in a decentral way. Site host organisations may claim costs for both user expenses reimbursement and for their own effort as part of their eLTER PLUS project funding.

Personnel costs: Users' personnel costs will not be covered.

Food and out-of-pocket expenses: For TA, the site host institution may provide all-inclusive subsistence rates. The amount will depend on whether meals are provided on-site or not. Subsistence rates will usually be determined in accordance with national regulations of the country where the site is located, and/or the usual practices of the site's host organisation. Alternatively, the site host institution may cover actual costs as incurred by the users instead.

Pre-payments: The scheme foresees costs reimbursement after users have fulfilled their reporting obligations. However, in justified exceptional cases, a pre-payment (e.g. to cover a flight ticket) may be granted. This decision is up to the site host organisation.

Total funds available

eLTER PLUS will make a total of 1.2 Million € available through its TA Scheme. These funds will support costs incurred by users as described above (ca. 300.000 €), and costs incurred by site host organisations during TA visits or RA performance (ca. 900.000 €). The host organisations of all the involved sites are Beneficiaries of the eLTER PLUS project.

Duration of TA

No maximum number of days is provided which a user group may spend at a site. The duration of the projects and the size of the user groups should be adequate in relation to the work to be performed. Experience shows that typically, a stay of one week per site is sufficient, however, depending on the planned work, this may differ, partly significantly, from project to project.

If a study requires several stays, e.g. related to seasonality, one project may encompass several visits to one site. In such cases, depending on funding available, two journeys to and from the site may be covered as well.

Oversubscription of sites

If users apply for TA or RA to a site, the funds of which have already been used up, such funds may be transferred from an undersubscribed site to the oversubscribed one, pending approval of both site owning organisations. Alternatively, users may be offered to perform a comparable study at another site that has unspent TA funds. As far as possible, the alternative site offered will have similar biogeographical characteristics.

Eligibility

Prerequisites for TA and RA users

eLTER PLUS offers access opportunities to user-groups or to individual researchers. In the former case, one of the group members must act as the group leader.

This user group leader or the sole user must be affiliated to an organisation in a country other than the country where the site they wish to access is located. In the case of a group of users, the majority of the group's members must also work in a country other than the country where the site is located which they wish to jointly access. For multi-site projects, this rule applies to all the sites to be accessed.

Users working for an organisation which is an eLTER PLUS Beneficiary, are in principle eligible for receiving TA and/or RA funding, however, limitations apply. This programme will not support users wishing to access a facility his/her own organisation owns or manages.

Users not working in a European Union Member State or H2020 Associated Country are eligible, provided they do not form the majority within the respective user group. However, well-founded exceptions are possible.

There is no formal prerequisite as to the users' education or their degrees held.

Dissemination of results and data policy

Prior to receiving access, user groups must confirm that they intend to disseminate the outcomes of their study conducted under the eLTER PLUS TA-RA Scheme. Users representing SMEs (Small and Medium Enterprises) are exempt from this rule. However, also to them, publishing their results is strongly recommended, e.g. through a company newsletter.

Whatever data is collected during the visit must be made available to the site owner organisation and to the wider scientific community within a reasonable time frame and without significant delays (recommended time frame: at most two years). Again, SME users are exempt from this rule. The data policy should presume a timely pathway towards Open Access. At the end of the project, or when publications arise during the project, data should be released using a standard Open Data license and be free of intellectual property rights (IPR). The eLTER TA-RA grant should be acknowledged in all products from the access related projects.

Successful users will be asked to provide a description of their visit, including photographs, and they may be invited to write a blog and/or social media messages during their visit, describing their experiences.

Sequence of process steps

The overall process or organising TA and RA within eLTER PLUS is divided into the following steps:

1. Call for proposals
2. Submission and file management
3. Eligibility check
4. Plausibility check by site owners
5. Scientific evaluation
6. Selection of projects
7. Notification
8. Reporting after TA-RA is completed

1) Call for proposals

Research teams are encouraged to apply for access by submitting a project proposal to eLTER PLUS. The application procedure is set up as a single-stage call for proposals.

Potential users who wish to be granted TA and/or RA to the eLTER PLUS sites find the needed information about access opportunities at the project website. This includes details on the sites that users may access, their location, biogeographical characteristics and instrumentation.

As mentioned above, eLTER PLUS TA-RA calls are set up both in a bottom-up and top-down fashion. In the case of the former, users are free to articulate their own research themes, in the case of the latter, such themes are defined as a thematic framework in line with the research challenges of the project to extend/deepen the project work jointly with users. Applicants interested in responding to one or more of the pre-defined research questions should refer to Annex 1.

As mentioned above, the two components of the TA-RA call, that is top-down with pre-defined research questions and bottom up with user-defined research questions, are considered

equally important. Thus, during the evaluation and proposal selection process, no preference will be given to proposals which address one or the other of the components.

Both cases may provide many opportunities regarding education.

2) Proposal submission and file management

Applicants should download and fill in the eLTER PLUS TA-RA Proposal Template (MS Word document) and submit it to the dedicated e-mail address provided on the eLTER PLUS project website. Supporting documents may be submitted as well, if needed. The template may later on be replaced by an online form. Applicants receive support during their proposal preparation in that they may send any enquiries to the same e-mail address. They will usually receive an answer within three working days.

Prior to formally submitting a proposal, the applicants are recommended to contact site personnel informally regarding their planned project work to check with them whether the work is feasible under the given natural and structural conditions and whether site personnel has to capacity to support this specific project work. Contact information is provided via the eLTER PLUS project website as well.

Calls are published annually with the following approximate timing (referring to the end of the related month):

- October: Publication of the call
- December: Deadline for submission
- March: Evaluation outcome and notification of users
- Projects typically are conducted during the summer season, but users may choose any timing as early as April.

All of the eLTER PLUS sites may be opened during a call or only a subset of them. This mostly relates to funding available.

For all proposals submitted, the applicants receive a receipt via e-mail confirming that their proposal was received. The proposals are stored in a secure, password-protected file store in the EU. Each proposal is assigned a unique identifier number which will precede the file name of the proposal itself and of all supporting or relating files to facilitate keeping them together. All proposals are recorded in a data base which will later on also be used to monitor the processes as described below.

3) Eligibility Check

The proposals are checked by the eLTER PLUS Access Team against the criteria set out in this document. In case of minor errors, such as an omitted field in the application template, the applicants are contacted and the errors corrected. In case a proposal fails the eligibility check (experience shows that this is, unfortunately, sometimes the case), the respective user group will receive a formal rejection letter explaining the reason for the rejection.

4) Plausibility Check

For all sites which have received one or more proposals, the respective site owner representatives or PIs (principle investigators) are requested to check the proposal(s) for plausibility:

- Regarding the site: Are the proposed activities doable at the site in terms of natural and structural circumstances (existing equipment, possible additional equipment needs, IT infrastructure, data records available, etc.)?

- Regarding personnel: Will it be possible to provide all the support the users will need to conduct the proposed project?
- Regarding logistics: Can the proposed project logistically be handled, e.g. moving around at the site, accommodation on-site or nearby, etc.
- Regarding physical access (TA only): Does the proposal justify an in-person visit to the site? In case of user groups: Is the size of the group reasonable or could a smaller group do the work just as well?
- Regarding possible restrictions: Is the proposed work in line with all pertinent regulations (e.g. it does not contravene restrictions in terms of health and safety, environmental protection, etc.)
- Furthermore, site owners are asked to rank the projects as a recommendation which ones should be selected.

Experience shows that rarely, but nevertheless now and then, proposals fail the plausibility check. In this case, again, the proposal is formally rejected. Regarding minor deviations, such as an overly large user group, the practice applied is similar to the eligibility check in that certain adaptations may be performed in consultation with the respective user group.

5) Scientific evaluation

The eLTER PLUS selection panel consists of representatives of the institutions which own or operate the sites which are made accessible through the access scheme. For the evaluation of top-down related proposals, researchers representing the respective research challenges in the eLTER PLUS project may be involved as well.

Proposal evaluations will be anonymous in that the proposers will be informed about the outcome of the evaluation results, but they will not know who has written them.

All applications received by the call deadline and which have passed the eligibility and the plausibility check will be evaluated whereby the following cases are distinguished:

- A site has received one or more proposal(s) which can be funded within the site's TA budget (possibly after a minor reduction of the requested budget). In this case, the proposal(s) will receive one scientific evaluation.
- A site has received proposals requesting funds exceeding the site's TA budget, that is a choice must be made, even in case all proposals are positively evaluated. In this case, the proposals will receive two independent evaluations.
- Multi-site proposals will always receive two independent evaluations.
- If two evaluations of the same proposal significantly deviate, a third evaluation will be conducted.

Evaluators should evaluate proposals which are in line with their personal expertise and which do not cause any conflict of interest. To ascertain transparency, fairness and impartiality, nobody may evaluate proposals requesting access to their own site, nor proposals by users from their own country. Furthermore, the evaluation pool members will be requested to choose from the received projects list considering their own qualifications and to avoid any possible bias.

Evaluation criteria are:

- Scientific quality (innovative, original, well founded?)
- Approach and methodology (adequate, clear, consistent?)
- Relevance for eLTER (in line with programme goals?)

For bottom-up calls: Each matter will be rated on a point scale of 5 (excellent) to 1 (poor) with a weighting of 2 : 2 : 1. That is, a proposal can receive up to 25 points. The thresholds for

passing the evaluation (before weighting) are 3, 3, 2. That is, if a proposal e.g., receives 5 points for a convincing scientific idea, but the approach is described in a rather nebulous manner and receives only 2 points, the proposal has failed the evaluation. There is no overall threshold value.

For top-down calls: The third criterion will be replaced by

- Relation to the chosen framework (good fit, contribution to the research challenge?)

In this case, weighting will be 1.5 : 1.5 : 2, that is, a proposal can again receive up to 25 points. The thresholds will be 3 for each criterion. Again, there is no overall threshold value.

In case a proposal is evaluated excellently for criterion 1 and 2, but rather weakly for criterion 3, it may be shifted to the bottom up component in consultation with the respective users.

Reviewers will use the *eLTER PLUS TA-RA Proposal Evaluation Form provided to them via the project cloud repository*.

6) Project selection

Final selection of TA-RA project is done by eLTER PLUS Access Team. The decision is primarily based on the outcome of the scientific evaluation. However, in line with H2020 regulations, several further criteria are being applied with less weight: Preference is given to promising young scientists at the start of their career, to scientists who have not previously used the installation, to those who are working in countries where – to the best of our knowledge – no equivalent research infrastructures exist, and to those who are not employed by one of the eLTER PLUS beneficiaries. Furthermore, the gender dimension is considered.

Not least, although site owner representatives are not permitted to evaluate proposals by user groups requesting access to their site, the recommended ranking by these site owners is taken into account.

7) Notification

After project selection is completed, all site owner beneficiaries are notified regarding the projects selected for their site and the resulting TA and travel budgets. The respective users and site personnel should establish contacts It is recommended that site owners set up a simple contract with their users considering legal matters associated with the TA journey and stay, e.g. insurance of users, travel documents, environmental regulations. This is, however, not mandatory. An example contract is annexed.

At the same time, all applicants receive a formal acceptance letter or rejection letter including contact information of the site staff who will support their work, and the anonymous reviews for their project.

8) Reporting after TA-RA is completed

Within one month after a user group has completed their TA visit or RA programme, they must submit the filled in *eLTER PLUS TA Reporting template* (available for download from the project website). It covers the fieldwork performed and the outcomes of their study and provides all information needed by the project to complete its access related reporting obligations towards the European Commission.

Users are expected to publish the outcomes of their project. Thereby, they must mention that their work has received financial support by the project eLTER PLUS, GA 871128, under

H2020. The host organisation who provided support during the project shall also be acknowledged. Moreover, users may offer co-authorship to host organisation researcher(s) based on common practice as currently used in science, relating to intellectual input to the respective publication. However, the mere hosting of users should not suffice for co-authorship.

Annex 1: Research questions for the top-down component of the TA-RA calls

Cf. the section "Top-down and bottom-up approach" above. Applicants may choose to address one or more of the below pre-defined research questions as the thematic framework of their proposal. In this way, the user projects shall be linked to ongoing eLTER PLUS work regarding priority research challenges.

Nevertheless, users may likewise define their own thematic framework and thereby demonstrate further opportunities regarding the usage of the eLTER Research Infrastructure. Both approaches are considered equally important and during proposal evaluation and selection, neither will be given preference.

Specifically, in the H2020 project eLTER PLUS, the science community is asked to support the development of the European eLTER research infrastructure. Thereby it is focussing on biodiversity, biogeochemical, hydrological and socio-ecological research. Six case studies, which are carried out with the project, are summarized below for applicants' reference.

Research done through TA and RA could supplement these studies. Therefore, we ask for projects in these areas of research, either through collecting and analysing data at single or more LTER sites/LTSER platforms or through remote data collection and analysis. Typical TA or RA projects focus on very specific processes or on selected ecosystems. These proposals could cover at least one of the following research questions:

1) Biodiversity is highly threatened in Europe and beyond. LTER provides unique long-term data and knowledge about drivers, trends and states of biodiversity in a multitude of ecosystems.
   - What additional data and methods are needed to improve this knowledge?
   - Are there ways to better structure and provide information on biodiversity and ancillary data?
   - How do metadata (standards, availability and quality) impact the selection of data in biodiversity case-studies? Does the selection of information (based on metadata) impact the robustness and usefulness of biodiversity models?
   - What are the impacts of contrasting data collection protocols on studies targeting long-term biodiversity trends? How is data management and sharing limiting our ability to assess biodiversity trends through space and time?
   - What are the processes behind biodiversity trends in specific European realms, biogeographic regions, ecosystems or taxonomic groups?
   - How can we benefit from remote sensing data (if so, by which ones) in supplementing on-site knowledge?
   - How can we improve the societal value of information/knowledge on biodiversity and which policies are needed or need to be improved to safeguard or restore biodiversity?
   - Which new sensors and/or methods are available to record elements of biodiversity in a novel way? Is there a relationship between pollinator biodiversity and crop health and crop yield; and if so, does this result in reduced N emissions to the atmospheres and waters?

2) Carbon and nitrogen cycling in ecosystems is pivotal for a number of ecosystem services provided to humans. LTER is a key research infrastructure to study the related processes at single sites or larger platforms.
   - How important are soil microorganisms, including mycorrhiza, for soil Carbon storage at different temporal and spatial scales and in different ecosystems?
   - How is ecosystem-scale carbon storage affected by nitrogen cycling?
   - What innovative method does improve our knowledge about Carbon and Nitrogen Cycling?
   - How is Carbon or Nitrogen cycling related to soil water limitation?
   - How are C and N fluxes affected by heavy precipitation events? What is the role of the initial environmental conditions (i.e. rain after drought vs. subsequent rain events)?
   - What is the impact of increasing drought across eLTER sites on (a) soil NO/N2O emission ratios, (b) NOx related atmospheric O3 concentrations, and (c) crop yields/ forest growth?
   - What societal measures can be applied to optimise ecosystem Carbon sinks?
   - What are the trade-offs between Carbon sequestration and biodiversity in different ecosystems and at different timescales?
   - How do the Carbon and Nitrogen cycles interact with other drivers (nutrients, ozone, climate, etc.)?
   - What innovative methods, including new sensors, can be applied at eLTER sites to improve our knowledge of local and/or regional scale Carbon and Nitrogen Cycling?

3) Ecosystems are increasingly exposed to water stress. In a typical LTER site, the hydrological processes are measured along with many other ecosystem processes and properties. LTSER platforms allow for socio-ecological studies
   - How does water limitation affect specific ecosystem processes?
   - Which remote sensing products could provide a better insight into the ecosystem water cycle?
   - Which new sensors and/or methods provide means to better understand ecosystem processes affected through water limitation?
   - How could society adapt to droughts and which policies are needed to improve the resilience of coupled socio-ecological systems?
   - How effective are riparian buffer strips minimising N - P - C compounds entering rivers/lakes across eLTER sites? What are the consequences on aquatic biodiversity, N2O, CH4, CO2 emissions?

Case studies within eLTER PLUS, provided here for applicants' reference

Task 8.1 – High resolution biodiversity data to assess environmental change

Task aims to determine and prioritise the stressors affecting long-term changes in biodiversity and identify indicators for characterising short-term variability and long-term trends in biodiversity. We make use of a relevant subset of data-rich eLTER Sites to quantify long-term trends and short-term variability in biodiversity, and relate both to changes in abiotic variables and socio-ecological parameters in order to a) explain trends and patterns in biodiversity, b) determine and rank the stressors affecting long-term changes in biodiversity trends, and explain short-term variability in response to pulse disturbance across major European ecosystems and c) identify appropriate indicators of ecosystem response. We will use state-of-the-art modelling techniques (e.g. biomod2, INLA-system-dynamic modelling) that are capable of dealing with short-term as well as long-term temporal trends in a spatially non-independent

context, and consider gaps in datasets. This approach allows us to evaluate the strength and added value of these unique eLTER datasets to (i) improve our understanding of how and why these ecosystems are changing, (ii) determine implications for ecosystem resilience and (iii) develop mitigation/adaptation measures.

Task 8.2 – Plot scale ecosystem process understanding

Task aims to increase process understanding of the impact of climate change and extreme weather events on C & N cycling and feedbacks in a broad range of ecosystems. Data on C and nutrient stocks & fluxes, climate, N deposition & management from eLTER Sites will be analysed; gap-filled using available models, such as EMEP for N deposition; and time series analyses will be applied. Extreme weather events (e.g. drought) will be characterised. Normalisation approaches, such as empirical probability density functions, will be used for cross-site comparisons. This will facilitate (i) identification of critical environmental thresholds and tipping points in C and N turnover and fluxes across the eLTER spectrum of ecosystems, climate zones and socio-ecological context and (ii) improvement of our understanding of the impact of extreme weather events and climate change on ecosystem processes. eLTER Site data will be complemented with remote sensing data from WP4, in order to evaluate the added value and the suitability of eLTER long-term data series to provide signals reflecting the influence of climate change on ecosystem processes.

Task 8.3 – Water use efficiency (WUE) of ecosystems and resilience to drought

Task aims to improve knowledge of the impact of drought events on ecosystem water-use efficiency (WUE) and resilience, and to understand relationships between WUE, soil structure, plant productivity and ecosystem resilience. Data from 10 well-instrumented sites that cross climatic, geological and socio-ecological regions will be used to test resilience indicators, such as WUE, nutrient use efficiency, soil structure and function. This analysis will use1D (plot) or catchment scale integrated models that consider water-soil-plant system. Key variables that control WUE and reflect drought stress (several regional drought events) will be selected for the modelling. An integrated model will be used to calculate WUE and simulate a climate series of at least 30 years in order to (1) assess the impact of drought events on the WUE of ecosystems, (2) analyse the resilience of the ecosystems with respect to their ability to recover single & multiple droughts, (3) understand the relationship between WUE, soil structure, plant productivity and ecosystem resilience and develop mitigation measures for drought adverse impacts, and (4) assess strengths and weaknesses of the RI-design to derive resilience indicators.

Task 9.1 – Representativeness towards pan-European biodiversity pressures and trends

The Task aims to compare long-term trends and drivers of biodiversity based on low sample size, high resolution eLTER data with high sample size, low resolution non-eLTER data (based on space-for-time substitution) at a pan- European scale. We will analyse biodiversity trends and relate these trends to abiotic drivers retrieved from climate models, remote sensing, land-use maps, and socio-economic parameters (GDP, demography, etc.) using two different datasets: a) > 200 long-term biodiversity datasets from > 100 eLTER sites across Europe covering terrestrial, freshwater and coastal ecosystems and b) data compiled from non-eLTER sources (> 10,000 sites, derived from e.g. EU Water Framework or Habitat Directive). We aim to disentangle the roles of large-scale alterations in climate, air pollution and land use changes, and local changes in habitat composition, structure, function, and pollution patterns, in determining trends in biodiversity of various taxonomic groups. We will test a wide range of possible indicators, including individual species, biodiversity metrics, selected metrics of functional and phylogenetic diversity and trait composition, to determine which are best suited as indicators of long-term changes in various regions and ecosystem types. By integrating these

two datasets, we will assess the value of, and potential improvements for, the pan-European long-term time series provided by eLTER.

Task 9.2 – The Water-Climate-GHG Nexus at the pan-European scale

The Task aims to test and pilot the co-location of eLTER and ICOS RIs so as to gain new insights into the pan- European water-climate-GHG nexus, better constrain estimates of the pan-European GHG emission and carbon footprint, and develop complementary mechanistic understanding. First, we will scope the water-climate-GHG nexus across eLTER catchments. To do so, the relevant DEIMS-SDR metadata will be updated with site PIs (including ICOS sites). In addition, large-scale modelled data (e.g. from Task 9.3, Copernicus products in WP4, ICOS products, etc.) will be identified. In collaboration with WP8 (Task 8.2), site specific estimates of GHG emission and carbon sequestration will be cross-validated against data from an independent set of eLTER sites, regionalised and up-scaled based on e.g. CORINE land cover data, climate information etc., and matched to GHG emission inventories from relevant ICOS sites. Second, a catchment-scale conceptual model of the water-climate-GHG nexus will be elaborated to better constrain estimates of the pan- European GHG emission and carbon footprint and add complementary mechanistic understanding to ICOS measurements. This will be achieved through a literature review identifying current approaches to site-scale modelling of the water-climate-GHG nexus that will then be used in a workshop with invited experts from eLTER/ICOS RIs, leaders of relevant Tasks in the project, and external researchers.

Task 9.3 – Testing eLTER network for a pan-European terrestrial ecosystem model

The Task aims to establish a validated pan-European scale terrestrial ecosystem model using eLTER network data, assess the impact of climate extremes on water related ecosystem services, and provide 30 years of reanalysed time series of hydrological fluxes. First, we will set-up the TerrSysMP (TSMP) model (with PARFLOW-CLM) for the pan-European domain at a 3 km resolution and run it for 30 years simulations. Second, we will validate the model runs against eLTER site's time series (Task 8.3). We will obtain the climatic forcing at this resolution by using a disaggregation scheme from large scale re-analyses. In addition to available time series from the eLTER network, we will use remotely sensed time series in cooperation with WP4 (e.g. SMOS, SMAP, Copernicus Hub services e.g. Sentinel data) and global soil moisture products (e.g. ESA CCI). The approach allows us to demonstrate the concept of ecosystem reanalysis for soil moisture time series, and the assessment of the strengths and weaknesses of the current eLTER network design regarding the impact of climate extremes on water related ecosystem services.

Annex 2: Example eLTER PLUS TA agreement

Note: It is recommended that site operating organisations conclude this or another simple agreement with their users. For user groups, one agreement should be set up to be signed by all of the group's members or, alternatively, individual agreements can be provided.

The TA visitor and PI (principle investigator or site manager) of the infrastructure have discussed the planned project and have agreed on: (please tick the appropriate boxes)

- ☐ working regulations at the site, including insurance for the people involved
- ☐ technical access to be provided
- ☐ measurement infrastructure services to be provided
- ☐ installation of visiting instruments during the project
- ☐ sharing, reporting and publishing of the data and research results

The TA application has been evaluated by the eLTER PLUS project and both the visitor seeking access and the principal investigator granting access have confirmed the project.

TA Site: _____ Country: _____

Name of visitor	gender	nationality	start date	end date	no days

Upon signing this agreement, the TA visitor(s) agree(s) to follow the TA and site instructions, including data policy and licenses at the site. The TA visitor(s) agree(s) to have his/her/their own insurance, covering all work-related liabilities, bodily injuries and possible damage to instrumentation caused by them. The costs for the TA visitor(s) will be reimbursed according to the eLTER PLUS TA rules. The TA visitor(s) are obliged to fill in the eLTER PLUS TA Project Summary Report after their project work is concluded.

Date, Place: _____

Full Name (TA Site Manager): _____

Signature:

Date, Place: _____

Full Name (TA User): _____

Signature:

Date, Place: _____

Full Name (TA User): _____

Signature:

Date, Place: _____

Full Name (TA User): _____

Signature:

Date, Place: _____

Full Name (TA User): _____

Signature:

Date, Place: _____

Full Name (TA User): _____

Signature: