

# OVERVIEW OF EUROPEAN LTER COMPONENTS

Long-Term Ecosystem Research (LTER) is an essential component of world-wide efforts to better understand ecosystems. Through research and observation, LTER seeks to improve our knowledge of the structure and functions of ecosystems and their long-term response to environmental, societal and economic drivers.



Putting something like LTER, with its enormous scope, into practice requires time and the constructive interplay of important building blocks. These comprise the involved research communities, properly equipped and operated research sites in the field, and institutions operating these sites in the long-term. Such continuous operation requires appropriate funding schemes across all organisational levels, from sites to countries, and at regional, continental and global scales.

LTER began in many places around the globe as research initiatives, driven by teams investigating ecosystem functioning at sites operated over long timeframes. What started bottom-up in a highly distributed manner, has evolved into a complex process of organising related communities, projects, services and research sites. Sites striving to operate in the long term and in a sustainable manner (beyond the short-term project lifecycle) have impacted the formation of institutional, national and global science and research infrastructure agendas. The components of the European LTER process reflect this development:

1

**The community and bottom-up networks in LTER-Europe.**

2

**A series of eLTER projects:** currently eLTER PPP and eLTER PLUS.

3

**The emerging formal eLTER Research Infrastructure (eLTER RI).**

**LTER-Europe** is a permanent network of national networks and a pool of sites, platforms, scientists and research institutions. LTER-Europe is the formal European regional group of the global ILTER network. The distributed research sites serve multiple purposes in the fields of ecosystem, critical zone, and socio-ecological research. LTER-Europe was formally founded in 2007 and currently (2023) comprises 26 national networks, >550 LTER Sites and >50 LTER Platforms where long-term interdisciplinary research and observation are carried out. The LTER-Europe pool of in-situ facilities and institutions are involved in numerous networking activities for a huge scientific community. LTER-Europe provides a framework for project development, conceptual work, education, exchange of know-how, communication and institutional integration.

## LTER-related R&D projects - Working engines for developing LTER in Europe

All funded eLTER projects and the eLTER infrastructure development are indicated by the lower case “e” ahead of “LTER”: “eLTER” [‘elta].

Many developments within the European LTER have been achieved through EU-funded projects, including Alternet, LIFE+ EnvEurope, ExpeER and eLTER H2020. The two



ongoing EC Horizon2020 projects were started in 2020 to organise the eLTER ESFRI process (eLTER PPP) and link it closely to scientific and other requirements (eLTER PLUS).

**eLTER PLUS** has three main pillars: networking, joint research activities and transnational, remote and virtual access to sites. Overall, the project aims to conduct a performance test of already existing elements of the emerging eLTER RI, challenging, assessing and strengthening its operations. Selected sites and platforms in terrestrial, freshwater and transitional water ecosystems are used to study ecosystem integrity, impacts of climate change and endangered ecosystem services at a pan-European scale. Alongside these case studies, eLTER PLUS is identifying and assessing innovative observational and analytical methods, elaborating detailed specifications of eLTER RI according to community needs (standard observations, site design), supporting community building and training, and piloting priority services (IT and other support).

**eLTER PPP** closely interacts with eLTER PLUS to secure the highest relevance of eLTER RI services for the several scientific communities and other eLTER RI user groups. It carries out all required planning needed for the high-level decision making and binding commitments necessary for constructing and operating the eLTER RI. eLTER PPP also coordinates the decision making processes towards the eLTER RI implementation as a legal entity (ERIC framework) at the European and related national levels (eLTER ESFRI process).

## eLTER ESFRI Process – Developing the eLTER Research Infrastructure (RI)

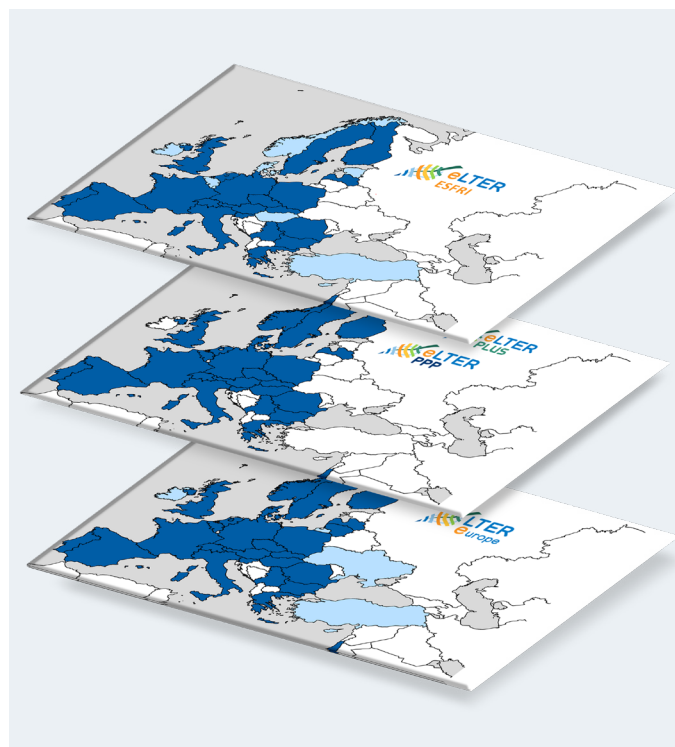
ESFRI, the European Strategy Forum on Research Infrastructures, aims to develop the scientific integration of Europe and to strengthen its international outreach, through the coordinated development of major research infrastructures. In autumn 2018, the eLTER RI was accepted onto the ESFRI Roadmap, paving the way for its further development and formalisation as a sustainable Research Infrastructure.

eLTER RI will adopt a whole system approach to observe and analyse the environmental system, including the human component in socio-ecological systems. It will comprise about 200 carefully selected terrestrial, freshwater and transitional water sites and socio-ecological research platforms.

The RI will execute in-situ, co-located acquisition of Standard Observations ranging from geochemical to biodiversity and socio-ecological data. These data will be complemented with relevant data from various other sources (Remote Sensing,

official statistics) to form the eLTER Information Clusters for each site and platform, and serve cross-disciplinary and trans-disciplinary research. While several existing environmental RIs focus on selected elements of environmental change, eLTER RI will holistically embrace the integrated impacts of stressors on a wide variety of European benchmark ecosystems.

eLTER RI will be open for researchers and other users. Through a single access point it will offer a wide range of services, such as access to sites, data, analytical and modelling tools, central analytical services and training.



● Emerging national LTER networks (bottom); countries where institutional commitments to ESFRI process was received (top) ● Existing national LTER networks (bottom), countries with political support to eLTER ESFRI process (top)

**Fig. 1:** The LTER-Europe network of national networks (bottom), provides a pool of around 550 LTER Sites and about 50 LTER Platforms for eLTER related R&D projects (centre) and as basis for the eLTER Research Infrastructure (top)

### Development of eLTER RI is supported by:



**country-level political Expressions of Support**



**Memoranda of Understanding from Research Performing Organisations in 28 countries**