***eco2adapt*'s Newsletter**
Volume 2, Series 1
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"*eco2adapt* is a Horizon Europe Research and Innovation action project funded by the European Union and coordinated by INRAE. It began in September 2022 and will run for five years with 31 partners from 11 countries. The project aims to provide solutions to combat the uncertain effects of climate change and promote resilient forest ecosystems for future generations."

eco2adapt: A surge of rapid progress and global engagement

Work in eco2adapt is accelerating rapidly, as can be seen from the outcomes in this Newsletter. The Kick-off of the Chinese project has consolidated forest research activities between east and west. The first technical report was submitted on time and will be presented to the Project Officers and reviewers at the end of the Annual General Meeting in July. The first batch of Practice Abstracts can be downloaded from the website and our social media accounts are buzzing!

With the eco2adapt project and results presented on a daily basis at the IUFRO World Congress, Stockholm, July 2024, eco2adapt is demonstrating its impact, even in the first 2 years. A second Summer School is on its way in Joensuu, Finland in August, so please sign up your students.

The next Annual General Meeting is in Brasov, Romania, right after the IUFRO conference, so partners will have plenty of time to discuss science, practice and social intervention… And don't forget, a visit to the Living Lab in French Guyana is planned for October 2024, with case studies of resilient tropical forestry to be presented. See you soon!

Alexia and Yong
Project coordinators, eco2adapt.

Exploring Diverse Ecosystems: Visits to Forests

Rhizotron installation in Wulito, Zhejiang, China with Dr. Jean-Luc Maeght of UMR AMAP – IRD, France.

By Ange-Marie Uwineza, ZAFU, China.

Wulito bamboo rhizotron experiment

In late October, ZAFU organized a field trip to the Wulito (Linan) plot in Zhejiang, China led by Dr. Fang and Dr. Mei of ZAFU, China, and Dr. Jean-Luc Maeght of UMR AMAP – IRD, France.

In the Wulito plot, healthy and representative young bamboos were identified for installing the multifunctional rhizotrons designed by UMR AMAP that allows to monitor the dynamics of root growth and turnover and to sample rhizospheric soils for chemical and microbial analyses.

This collaboration between ZAFU, China and UMR AMAP, France is part of WP5 in the *eco2adapt* project, making Wulito the first site outside of Europe to install the rhizotrons.

Photos were taken during the field trip. Dr. Maeght gave a short briefing on the Rhizotron installation procedure and then proceeded to clear the soil around the surface of the selected young bamboo and install the Rhizotron.

Different steps of Wulito bamboo rhizotron experimental study

Living Lab Dzukija National Park (Lithuania) attracts international attention

Gediminas Brazaitis and Gailenė Brazaitytė, VDU

Dzukija National Park Living Lab was visited by SILVA Network and group of European parliament members in the mid of April.

In 16-18th April 2024, Silva Network had organized annual conference in Vytautas Magnus University (Kaunas, Lithuania). SILVA Network centers on Forestry higher education aiming to stimulate and facilitate interuniversity co-operation in the field of forestry education in Europe and is a part of the Association for European Life Science Universities (ICA). The conference was attended by forestry scientists from various European countries, including Germany, Switzerland, Finland, Sweden, Netherlands and others. The forests, aims, structure and activities of the Living Lab was presented and discussed during the field visit to Dzukija National Park. Rhizotron study of *eco2adapt* 5.3 task attracted great interest, followed by discussions of its design, added value to science and future forest resilience. In Lithuania, 12 rhizotrons were installed during the summer 2023 to better understand the underground role in the forests. We are aiming to compare pure and mixed, pine and birch stands in dry and humid soil conditions.

The visitors of SILVA network group to Dzukija National Park Living Lab

The next day, on 19th April 2024 Living Lab Dzukija National Park was visited by Anna Deparnay-Grunenberg, a member of the European Parliament (Greens/EFA, Germany), forest expert and shadow rapporteur on the EU forest strategy in 2020; Franziska Achterberg, a Biodiversity Campaigner of Greens/EFA Group, European Parliament; Siim Kuresoo, a European Forest Campaigner at Fern; Žymantas Morkvėnas, a Director of the Baltic Environmental Forum, expert of biodiversity conservation and environmental policy, and several guiding people. During the visit, we had interesting discussions regarding climate change impact to forest ecosystems and forest resilience, alternatives of clear-cutting forest management by selective felling's, the role of deer's on successful natural regeneration and nature restoration by opening inland dunes. We also presented Rhizotron study as one of the main networking activities among *eco2adapt* partners.

Discussions with European Parliament members about the management, resilience and future of Forests in hemoboreal Lithuania

Tense opening moment of Rhizotron

Forest underground is not well studied but extremely important for the future of our forests

Exploring Diverse Ecosystems: Visits to Living Labs and Forests

Inter-organizational Exchanges between China and EU Project Implementers

Upon the invitation of Prof. Alexia Stokes from the INRAE, Prof. Frank Berninger from the University of Eastern Finland, and President Abrudan Ioan Vasile of the University of Transylvania, Romania, Prof. Fuxiang CHU, President of the Chinese Academy of Forestry, led the delegation of the *eco2adapt*-China Project members comprising Prof. Hongyan JIA, Dr. Yong PANG (project leader), Dr. Shuirong WU (leader of Task 6) and Dr. Tao YU, to visit France, Finland and Romania from October 8th to 19th, 2023. They visited the INRAE, the UEF, the EFI and the University of Transylvania. Also they made field trips to three living labs of the EU Project, i.e., Landes plantation in France, field wildfire living lab in Finland, and the Ledera Naturally Regenerated Broad-leaved Forest in Romania. Prof. CHU and the other delegates had in-depth exchanges with the above-mentioned organizations on scientific research, technical application, industry promotion, personnel exchange and project cooperation, reaching a number of consensus for future cooperation.

Chinese researchers visit to the European Forest Institute

Discussion and exchange between the EU and Chinese researcher at the University of Eastern Finland

Chinese reserachers visit to the Finnish forest fire living lab

Chinese researchers visit to the Landes plantation

Chinese researchers with President Abrudan Ioan Vasile of UNITBV, Romania

Chinese researchers visit to Naturally Regenerated Broad-leaved Forest in Iedera Living lab

Hohai University Hosts Scientists from UNIFI, CAF, and ZAFU

Matteo Mura, UNIFI

Participants to the meeting: Wang Chen, Giovanni Forzieri, Yu Tao (from left to right).

On December 14, 2023, at Hohai University in Nanjing, China, has been held a meeting of the *eco2adapt* project. The project is aimed to studying forest resilience in the face of escalating forest disturbances caused by climate change.

Scientists from the Department of Civil and Environmental Engineering at the University of Florence (UNIFI), the Chinese Academy of Forestry (CAF) and Zhejiang Agriculture and Forestry University (ZAFU), attended the meeting to discuss potential challenges and critical issues during the advancements of the project, as well as explore future synergies and collaborations to enhance the comprehension of the intricate mechanisms threatening the status and resilience of forests in China and Europe.

To enhance the validity of the findings, the partners plan to facilitate future collaborations and exchanges among students and researchers from all partner institutions. This will provide an opportunity to share expertise and refine methodologies and approaches.

The project explores in the spatio-temporal domains the environmental factors that drive forest disturbances. Such drivers will be projected in future climate scenarios to develop adaptive strategies.

The scientist discussed also the ambitious development of an early warning system for forest tipping points in forest ecosystems. The system will work on a near-real-time monitoring of disturbances based on slowing down indicators derived from satellite spectral indices.

Overview of the Living Lab

Living Lab in EU: City Forest Freiburg

The living lab **City Forest Freiburg** (Stadtwald Freiburg) is located in the southwest of Germany between the Upper Rhine Valley and the edges of the Black Forest.

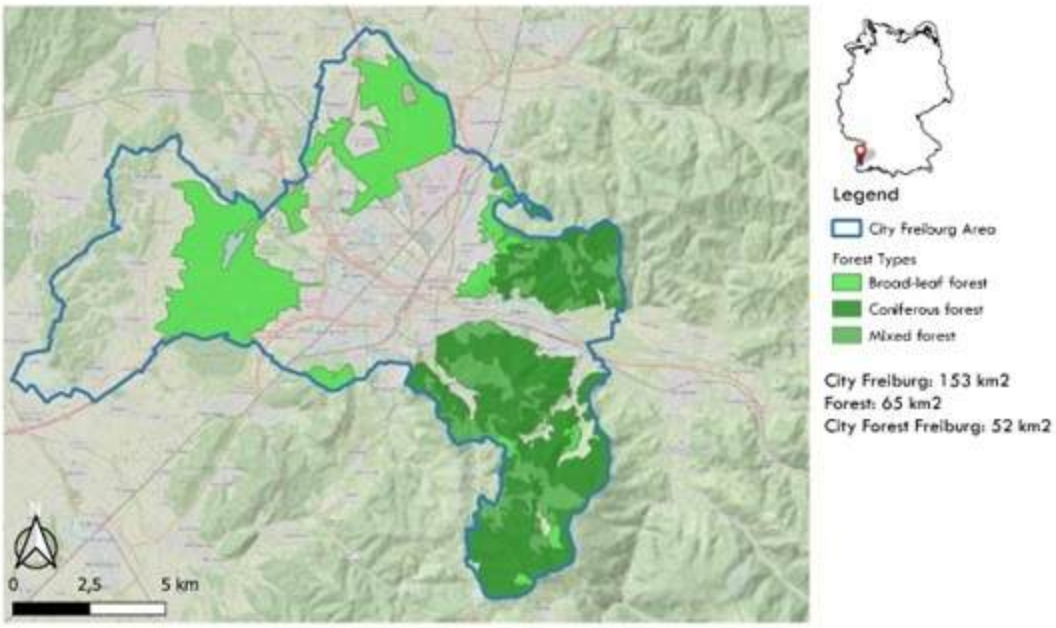
The independent city forest office manages the forest according to strict ecological criteria certified by the Forest Stewardship Council (FSC), where it was the first forest to be certificated in South-West Germany in 1999. The management focuses equally on four main objectives: timber production, nature

conservation, climate change mitigation and recreation.

The City Forest Freiburg can be divided into two distinct types, the lwoland broadleaf forest of the Rhine plain in the north-west of the city and the montane coniferous and mixed forest on the edges of the Black Forest in the east and south-east of the city.

The broadleaf forests of the Rhine plain make up around 40% of the City Forest area and consist mainly of the species oak (*Quercus spp.*) as well as European Ash (*Fraxinus excelsior R.*), Sycamore maple (*Acer pseudoplatanus L.*) and hornbeam (*Carpinus betulus L.*).

The climate of the Rhine plain is mild (mean annual temperature 10.4°C) and mean annual precipitation is moderately high (880mm).



Living lab Freiburg, Germany Temperate peri-urban forest

The montane and mixed forest stands on the edges of the Black Forest cover around 60% of the City Forest Freiburg area and consist mostly of the species Norway spruce (*Picea abies (L.) H. Karst.*), Silver/ Douglas fir (*Abies alba Mill., Pseudotsuga menziesii (Mirb.) Franco*) and European beech (*Fagus sylvatica L.*). In contrast to the climate of the plain, the climate of the montane forest varies highly by altitude with mean annual temperatures ranging from 5 – 9°C and mean annual precipitation from 950 – 1800mm.
In general, the stand volume of the City Forest Freiburg is increasing with a total plus of 4% compared to 2010. Management aims on ecosystem stability and rejuvenation. Rejuvenation is dominated by European beech, Sycamore maple, Silver fir, hornbeam and oak. Nevertheless, the ecosystem of City Forest Freiburg is challenged by multiple climatological factors thus needs adaptation strategies to achieve forest resilience.

Forest Resilience Challenges

The broad-leaf forests of the plain are affected by water stress caused by low groundwater tables as well as summer droughts. Upward trends in frequency and duration of droughts due to climate change impact groundwater recharge and thus levels. Especially oak forests are impacted by both lower groundwater tables in combination with hot temperatures and summer droughts which not only cause ecological harm but also production challenges (Skiadaresis et al., 2019).

Regarding the montane forests, recent increases in the frequency and intensity of windstorms and droughts events accompanied by high temperatures have highly affected the forest. Water stressed forest stands favor pest infestation causing with the above-mentioned problems major tree mortality. These observed events are forecasted to continue in the future and become harsher in the midterm and as climate changes.

Outlook.

The objective of all stakeholders of the City Forest Freiburg is maintain and promote the forest's diversity and stability under climate change conditions. Overall, a key objective is the increase of heat and drought tolerant species as well as the promotion of mixed uneven-aged forests by higher amount of management interventions and rejuvenation. Harvesting amount should be kept stable aiming on good quality wood for sustainable production and ex-situ carbon storage. For recreation and tourism, highly frequented areas are managed focusing on aesthetics and forest care (e.g., safety and trails).

In the year 2020, clear action has been defined to safeguard the future of the City Forest Freiburg. However, the planning horizon of the key Objectives is only for the next decade. Climate change will become harsher in all likelihood with destructive impacts amplifying in the distant future. Therefore, it is highly important to analyze the conditions and challenges of the City Forest Freiburg in 2050 or even 2100 as well as discuss the robustness (ecological and social resilience) of the decisions of the 10-year planning in the long-term future.

Reference: Skiadaresis, G., Schwarz, J. A., and Bauhus, J.: Groundwater Extraction in Floodplain Forests Reduces Radial Growth and Increases Summer Drought Sensitivity of Pedunculate Oak Trees (Quercus robur L.), Frontiers in Forests and Global Change, 2, 2019.

Living Lab in China: Western Sichuan

Pinus densata forest located in Yajiang County,Ganzi Xizang Autonomous Prefecture, Sichuan Province. Sichuan is one of the provinces where fires have occurred the most frequently with large burned forest area, while Ganzi Prefecture is one of the most affected regions. Investigations on vegetation and soil nutrients will be conducted based on the previous investigation in 2018.

We will analyze the effects of forest fire on tree rings, litter nutrients, litter/soil seed banks, soil microorganisms and carbon pools of ecosystem components. This research is expected to reveal the impacts of forest fire disturbance on alpine pine forests and its restoration mechanism, and provide scientific evidence and data support to elucidate the resilience feedback mechanisms of forest ecosystems to fire disturbance.

Source: Newsletter of China-EU Project eco2adapt, second Issue

Photo (left and above). Forests, six months following the 2018 fire.

Photo (left and above). Forests, five years following the 2018 fire.

Scientific news

How to upload data to the knowledge base?

Mougenot (UM), V. Armant (IRD), F. Vargas Rojas (IRD)

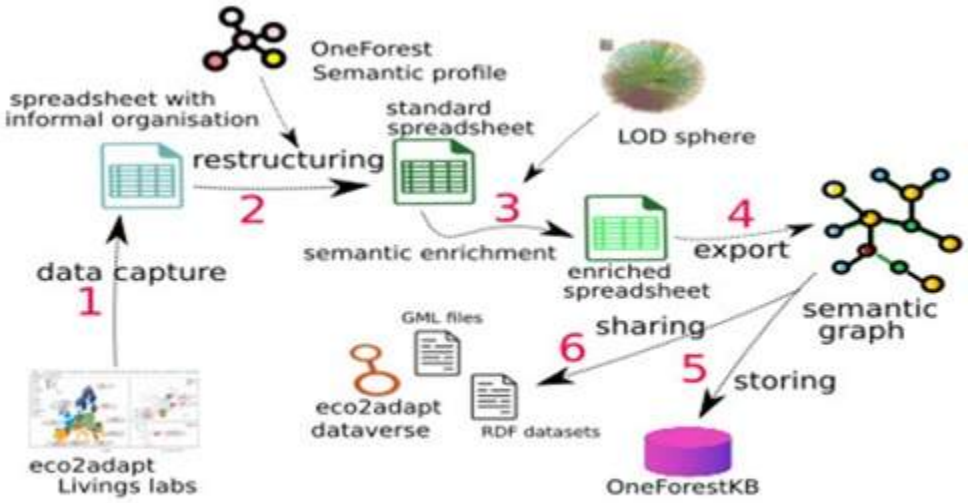
Data is currently being acquired, particularly in the different living labs of the project. At the same time, the OneForest knowledge base is being built and made accessible on the Web (see https://purl.org/oneforestkb/LivingLabMapDiscovery and Figure 1).

A semantic profile is being used as a pivotal model to facilitate both populating and consulting the data in the OneForestKB. The current data in the KB relates mainly to the experimental forest plots in the GuyaFor network (see https://paracou.cirad.fr/website/experimental-design/guyafor-network) and will be used to prototype and validate developments around the knowledge base.

To this end, a data processing workflow has been defined, with activities devolved to those involved in the living labs (data producers) and others devolved to the designers/developers of the knowledge base (IT people). Among these developments, particular attention is being paid to services designed to feed the knowledge base with data collected within the project.

This processing chain takes as its input a tabulated file built using a spreadsheet program such as Microsoft Excel, or Open Office Calc, which is often the medium of choice for scientists to record their data. The aim is then to reorganise this tabulated file to establish correspondences between its content and the concepts organised within the semantic profile.
Direct correspondences are thus established on the basis of the notions of collections of observations, observations, entities of interest to which these observations relate, characteristic properties measured or

observation results.



Importance is also given to reconciling the content of the file with existing open and linked data sources, of which there are many in the living world, enabling data and knowledge to be standardised so that they can be better integrated and enriched. The workflow is illustrated in Figure 2. As input, the data producers have tabulated files (data workbooks) with their own organisation in sheets and columns. Each sheet is then reorganised to meet our two requirements:

- standard structuring of the file: this involves orienting the organisation of the workbook to make it easier to incorporate the content within the KB, based on the semantic profile. A spreadsheet template has been defined for this purpose.
- content standardisation: aligning the values in the cells of thespreadsheet for the entities of interest and the properties measured with the ontologies commonly used in plant ecology. This alignment requires close collaboration between the data producers and the knowledge base managers.

Once the file has been reworked, additional data (or metadata) is added to guarantee the provenance of the data and to attribute the data credits to their authors.

A Java language package has been developed to export the data contained in the spreadsheets in semantic formats (RDFS, OWL). The semantised data can then be incorporated directly into the knowledge base, or deposited in the form of datasets on the *eco2adapt* dataverse.

Outreach

Ten practice abstracts.

Leena Leskinen, FFC

FFC coordinated the writing process of practice abstracts and contributed three out of ten. In the first batch, *eco2adapt* researchers focused on four key objectives. First, they identified optimal methods to collect ecological data across various EU Living Labs, with applicability extending to China. Second, they outlined effective forest management practices. Third, they prioritized mobilizing citizens, particularly youth, for climate action. Lastly, they aimed to foster citizen and stakeholder collaboration in scientific endeavors.

Practice Abstract 1, "Monitoring wildlife using camera traps in Lithuania's Dzukija National Park Living Lab," illuminates the observation of animal behavior in natural settings, offering insights into population dynamics and species distribution.

Practice Abstract 2, "How to measure tree root growth in a forest," delves into the challenges of assessing subterranean activity, shedding light on the often-overlooked root systems' significance in tree health and ecosystem dynamics.

Photo of Practice Abstract 1. A grey wolf (Canis lupus) and a moose (Alces alces) photographed using the automatic wildlife camera traps in Dzukija National Park living Lab. VDU.

Practice Abstract 4 introduces a management solution for fostering the growth of valonia oak within the silvopastoral systems of Xeromero, Greece. Following that, Practice Abstract 7 presents a commendable forest management practice focused on "Logging using own harvesting team" in Romania.

In our efforts to attract stakeholders, we've devised several impactful practices. These include "Fostering joint action: bridging stakeholder engagement and media outreach" (Practice Abstract 5), "Participation as a stand holder to exhibitions and how to activate youth there" (Practice Abstract 8), and "Using plant identification app to awaken people's interest for nature" (Practice Abstract 10).

Photo of Practice Abstract 3. Creating common understanding and action in bark beetle damage. FFC.

Photo of Practice Abstract 4. Tree regeneration in the valonia oak silvopastoral systems of Xeromero, Greece. AUA.

Moreover, to engage citizens and stakeholders in our scientific endeavors, we're excited to share a range of practices. These encompass workshops, field excursions, FUS, and surveys. For detailed insights, refer to the abstracts: "Using surveys to identify forest visitors' preferences for recreation" (Practice Abstract 3), "Participatory mapping and allocation of forest use suitability (FUS)" (Practice Abstract 6), and "Creating common understanding and action in bark beetle damage study" (Practice Abstract 9).

Photo of Practice Abstract 6. Rhizotrons installation at a site. Root production and mortality can be observed through the large pane of glass and smaller rhizotrons can be installed for destructive sampling of roots and soil.

Photo of Practice Abstract 8. Examples of remarkable trees a school class found during nature reserve excursion organized by ENO Schoolnet Association. Photos by Maire Turunen from ENO Schoolnet Association.

All practice abstracts can be downloaded from https://www.eco2adapt.eu/practice-abstracts

Upcoming events

IUFRO 2024 is just a stone's throw away!

Prof. Frank Berninger, UEF

eco2adapt will be present in several sessions at the IUFRO world-congress in Stockholm.
Alexia Stokes will present the project on Friday afternoon 16:20-16:30.

Sessions organised by *eco2adapt* scientists are at least:

S4.4 Socio-ecological conflicts in forest management: risks of (not) adapting? Moderated by Rasoul Yousefpour (Monday and Tuesday).
T3.11 Forest resilience: the vision from belowground Moderated by Yunwei Lu and Frank Berninger (Tuesday).
T5.27 Operational tools improving forest biodiversity Monitoring from space: Finding solutions to 2030 conservation targets organised by Sandra Luque and Dino Ienco and others (Friday).
T1.10 Enhancing forest resilience for water-related ecosystem services in a changing environment (Tuesday) co-organised by Henrik Hartmann.
T3.19 Increasing the potential of natural regeneration in restoring degraded forest and deforested lands around the world: concepts, strategies, experiences and guidelines (Tuesday) co-organised by John Stanturf and others.

Presentations are too numerous to be mentioned here.
We intend to have an informal get-together of *eco2adapt* people with beer. We would leave at 18:15 after Session T3.11. leaving from Room 11. If you want to join later please send a mail to Frank.Berninger@uef.fi

Announcement

Ecosystem Restoration and Climate Change

Course dates: 5-16 August 2024 (2 weeks)

Course extent: 5 ECTS

Course coordinator: Frank Berninger (frank.berninger@uef.fi)

Under current EU legislation and international agreements there is an increasing obligation to protect and restore ecosystems. While restoration is scale up, there is increasing emphasis on using natural processes to restore damaged ecosystems like in rewilding. Ecosystem restoration also emphasizes increasingly human wellbeing and a portfolio of ecosystem services that are to be enhanced. Furthermore, there is increasingly room for private actors in restoration and conservation processes. The course gives, using concrete examples from North Karelia an overview of natural, economic, legal and social frameworks for ecosystem restoration. The summer school has international collaboration from the Zhejiang A&F University (China) and Universities in Ghana. The work is done in collaboration with the Eco2adapt, GCUN and Microeco projects.

The summer school will be held in Joensuu, Finland

Fees:

Participant, normal fee: 500 euros for 2-week-course, 300 euros for 1-week-course.
Participant from the UEF partner university: 400 euros for 2-week-course, 250 euros for 1-week-course.
Incoming UEF exchange student: 200 euros for 2-week-course, 200 euros for 1-week-course (https://www.uef.fi/en/uef-summer-school).

Apply at: https://www.uef.fi/en/uef-summer-school-courses

Optfor-EU

The 4-year project (2023-2027) 'OPTimising FORest management decisions for a low-carbon, climate resilient future in Europe' (OptFor-EU) will support EU forests in their capacity to mitigate and adapt to climate change. 16 partners from 9 countries will work together to co-develops a Decision Support System (DSS) with forest managers and other forest stakeholders, that provides them with suitable climate adaptation and mitigation options for science-based optimising forest ecosystem services (FES) (including decarbonisation) and enhancing forest resilience and its capacities to mitigate climate change across Europe. For more information please visit: https://optforeu.eu/

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