



D3.1 Living Lab Learning Communities Mapping

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D3.1 Living Labs Learning Community Mapping

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Table of contents

Table of contents	4
Key takeaway messages	5
1. Introduction	7
2. Methods	9
2.1 Living Labs social-ecological context	9
2.2 Stakeholder mapping	10
2.3 Key sampling sites and target species	12
2.4 Mapping of stakes	12
3. The OneSTOP Living Lab network	14
3.1 Overview of the OneSTOP Living Labs	14
3.1.1 Overview of the Living Labs' social-ecological settings	16
3.1.2 Overview of the Living Labs' stakeholders	19
3.2 Portugal Living Lab	26
3.2.1 Social-ecological setting	26
3.2.2 Stakeholder mapping & formation of core Learning Community	27
3.2.3 Key sampling sites and target species	31
3.3 Coventry & Warwickshire Living Lab, United Kingdom	32
3.3.1 Social-ecological setting	32
3.3.2 Stakeholder mapping & formation of core Learning Community	33
3.3.3 Key sampling sites and target species	36
3.4 Belgium Living Lab	38
3.4.1 Social-ecological setting	38
3.4.2 Stakeholder mapping & formation of core Learning Community	39
3.4.3 Key sampling sites and target species	43
3.5 Constanta Living Lab, Romania	46
3.5.1 Social-ecological setting	46
3.5.2 Stakeholder mapping & formation of core Learning Community	47
3.5.2 Key sampling sites and target species	50
3.6 Uusimaa Living Lab, Finland	51
3.6.1 Social-ecological setting	51
3.6.2 Stakeholder mapping & formation of core Learning Community	52
3.6.3 Key sampling sites and target species	56
4. Acknowledgements	58
5. References	59
6. Appendices	61







Key takeaway messages

- Five OneSTOP Living Labs have been established across Europe, bringing together more than 100 individuals representing approximately 50 regional stakeholder organisations with an interest in the detection and management of invasive alien species, to test innovative technologies in their local area.
- The Living Labs are located in Belgium, Finland, Portugal, Romania and the United Kingdom, representing a range of social, political, ecological and climatic regions and invasion histories, and each corresponding roughly to NUTS 2 scale.
- Relevant stakeholders identified within each Living Lab area have been mapped onto the different categories of the quintuple helix innovation model as either Education and Research, Civil Society, Business or Public Sector, with the fifth helix representing the natural environment. Most stakeholders identified were either Public Sector or Civil Society organisations, with fewer from the Education and Research and Business sectors.
- Each Living Lab has identified a range of sites and non-native species of interest for trialling the technologies and innovations going forward.

Executive summary

Five European Living Labs have been established within the OneSTOP project, bringing together more than 100 individuals representing approximately 50 regional stakeholder organisations with an interest in the detection and management of invasive alien species, to test a range of innovations and technologies within their local area. The Living Labs are located in Belgium, Finland, Portugal, Romania and the United Kingdom, and represent a range of social, political, ecological and climatic regions, corresponding roughly to a NUTS-2 level, as well as a range of invasion histories. This report visually and preliminarily outlines the social-ecological settings of each Living Lab and maps their associated Learning Communities. It reports on the local and regional stakeholders involved in IAS management within each Living Lab area, identified through local knowledge and desk research, and using a snowballing technique to expand the network. Identified stakeholders are mapped to the quintuple helix innovation model, namely as belonging to either Business, Civil Society, Education and Research or Public Sector, with the fifth helix representing the natural environment. Identified stakeholders were invited to an initial establishment meeting for their local Living Lab, where the project was presented and baseline knowledge and expectations were recorded. Each Living Lab also began to identify target sites and non-native species to trial the technologies with. Key stakeholders were invited to form a core Learning Community representing approximately 8-12 organisations to sit at the heart of each Living Lab going forward. This report details the formation of these core Learning Communities, and reports on the critical sites and target species identified as being of key local interest by each of the Living Labs. This mapping provides a foundational understanding of each Lab's socio-ecological dynamics and stakeholder networks.

Non-technical summary

Living Labs are places where a range of individuals and organisations with a shared interest can come together to test technological innovations in a real-world context. As part of the OneSTOP project, we have established five Living Labs across Europe to test technologies





D3.1 Living Labs Learning Community Mapping

and innovations relating to the detection and monitoring of invasive alien species (IAS). IAS are species introduced to areas outside of where they are considered native, where they have negative impacts on nature, people or the economy. At the heart of the Living Labs are a community of stakeholders from businesses, civil society, the public sector and education and research, with an interest in detecting and managing IAS within their region. This report details who the stakeholders are, how they were identified and the species and locations they are interested in trialling the technologies and innovations from the OneSTOP project on.

List of abbreviations and definitions

airDNA	Airbourne DNA, a type of environmental DNA or eDNA
AMI Trap	Automated Monitoring of Insects Trap
AU	Aarhus University
CamAlien	Vehicle-mounted high speed camera monitoring system
CIBIO	Associação BIOPOLIS
CU	Coventry University
EU	European Union
EV-INBO	Eigen Vermogen van het Instituut voor Natuur-en Bosonderzoek
IAS	Invasive alien species
iEcology	The study of ecological patterns and processes using digital data generated for other purposes
LUKE	Natural Resources Institute Finland
MBG	Meise Botanic Garden
NUTS 2	Nomenclature of Territorial Units for Statistics Level 2
PK	Platform Kinetics
UKCEH	UK Centre for Ecology & Hydrology
UOC	Universitatea Ovidius din Constanța
WP	Work Package





1. Introduction

Invasive alien species (IAS) are recognised as a major threat to nature, nature's contributions to people, and good quality of life globally (IPBES 2023). IAS management is therefore a priority that governments have internationally committed to tackling in target 6 of the 2022 Kunming-Montreal Global Biodiversity Framework, as well as in EU and national strategies. The IPBES assessment (2023) found that previous management targets have only partially been achieved, highlighting knowledge gaps in adaptive management methods and restoration of habitats, alongside monitoring and evaluation of the effectiveness of different management strategies. Nevertheless, it concluded that the negative impacts of IAS can still be largely prevented and mitigated through effective management and access to adequate and sustained financial and other resources and recommended an integrated governance approach in which engagement across all stakeholders and local communities, sharing of control methods and data, enhanced collaboration, and innovation are key elements.

Following this approach, OneSTOP brings together environmental scientists, technology developers, environmental practitioners, land managers and local recorders in a network of place-based Living Labs, defined as “spaces for co-innovation, through participatory, transdisciplinary systemic research” (Bouma, 2022, p.752). This approach addresses the overarching objective of OneSTOP to pioneer an innovative and joined-up approach to biosecurity for terrestrial IAS, by applying cutting-edge technologies and strengthening the interconnections between animal, plant, human and environmental health (Groom et al. 2025). The OneSTOP Living Lab network is designed as an open innovation ecosystem bringing together diverse stakeholders to co-create, test, and refine solutions developed by project partners in real-world settings, focusing on early detection and monitoring tools (Fig. 1.1; developed in tasks 2.1, 2.2 and 2.4 of OneSTOP Work Package (WP) 2). Moreover, the network will also be utilised to test the OneSTOP alert system (of task 4.3 in WP4), and pilot the data driven horizon scanning workflow (of task 5.3 in WP5). Stakeholders in the Living Labs will also be invited to contribute to defining the scope and evaluate the communication outputs (developed in task 1.4 of WP1) and engage in the policy case studies and forum (of task 6.4 of WP6).



Figure 1.1: Some of the key technologies and innovations to be tested by the Living Labs as part of the OneSTOP Project. From left to right: a BiotaTrace airDNA sampler; a visual representation of iEcology, the study of ecological patterns and processes using digital data generated for other purposes; an AMI Trap for automated insect monitoring; a CamAlien vehicle mounted camera system; an example of PlantAlert data using gardens as sentinels to identify potential invasive species.

The Living Labs have been established in Belgium, Finland, Portugal, Romania and the United Kingdom (Fig. 1.2). These locations have been chosen to represent a range of social, political, ecological and climatic regions. The Living Labs will facilitate the exchange of





knowledge, enabling countries to learn from each other, especially regarding IAS that are present in one country but have not yet been introduced to another. Experiences with the uptake and usability of the technologies and innovations within the Living Labs through this participatory approach will provide actionable feedback to researchers and developers throughout the project. Furthermore, the Living Labs will feed into broader discussions regarding public communication and ethical aspects of IAS management, as well as help explore future scenarios and policy contexts. This Deliverable explores the social-ecological context of the five Living Labs, maps the stakeholders involved in the Living Lab core Learning Communities and outlines the specific species and sites of interest going forwards.



Figure 1.2. A map showing the locations of the five OneSTOP Living Labs across Europe: from left to right, Vila do Conde, Portugal; Coventry, United Kingdom; Brussels, Belgium; Uusimaa, Finland; Constanța, Romania. Image © Google INEGI.





2. Methods

Here we describe the methods used to give an overview of the social-ecological context of the Living Labs and their invasion status, and some background relating to the stakeholders involved in the Living Labs. We then detail the methods used by the individual Living Labs to identify and categorise their stakeholders, and to identify their key sampling sites and target species.

2.1 Living Labs social-ecological context

To understand the social-ecological context of the Living Labs, a desk-based study drawing on a range of sources to identify information about the five locations at an approximately-NUTS2 scale was undertaken by the local consortium partners. Data on climate was collected using the Köppen-Geiger climate classification to ensure a standard approach across the Living Labs. Average annual temperatures and annual rainfall was collected by country for 2022 from the World Bank Group (WBG, 2022). Comparative GDP in million Euros and GDP per capita for each of the NUTS2 regions were collated as a proxy for relative socio-economic status. These were collated using data for 2023 from Eurostat (Eurostat 2025) and the Office for National Statistics for the United Kingdom (Office for National Statistics 2025). Figures for the United Kingdom are an average of the values for the two NUTS 2/ITL2 regions that are represented in the Living Lab area and using a GBP to Euro conversion rate for 2023 of 1.1492.

To determine and compare the relative invasion status of each of the five countries, the proportion of 41 plant species and 47 animal species on the list of IAS of Union concern in 2022 were compiled as either established, recorded or not currently recorded as present (but may have been historically eradicated) in each of the five OneSTOP Living Lab countries. Figures were taken from the 2022 EU brochure ‘An introduction to the invasive alien species of Union concern’ (Brundu et al. 2022) for Belgium, Finland, Portugal and Romania, and from the NBN Atlas (<https://species.nbnatlas.org/>) and GB Non-Native Species Secretariat Information Portal (<https://www.nonnativespecies.org/non-native-species/information-portal>) for Great Britain (comparable figures for the whole of the UK are not available). These figures are based on species recorded and therefore species may be present but not recorded or may potentially be mis-identified. For some species, their presence is unknown in some regions although data are complete for most species and locations. Summary charts were plotted in Microsoft Excel.

2.2 Stakeholder mapping

The stakeholder mapping activity aimed to identify any local and regional actors already actively engaged with the prevention and management of invasive alien species within each Living Lab area. This desk-based exercise involved the local consortium partners recording any relevant stakeholder organisations already known to them into a standardised table. These initial stakeholders were mapped against four of the five strands of the quintuple helix innovation model: namely Research and Education, Public Sector, Civil Society and Business (Fig. 2.1), with the fifth helix representing the wider natural environment.



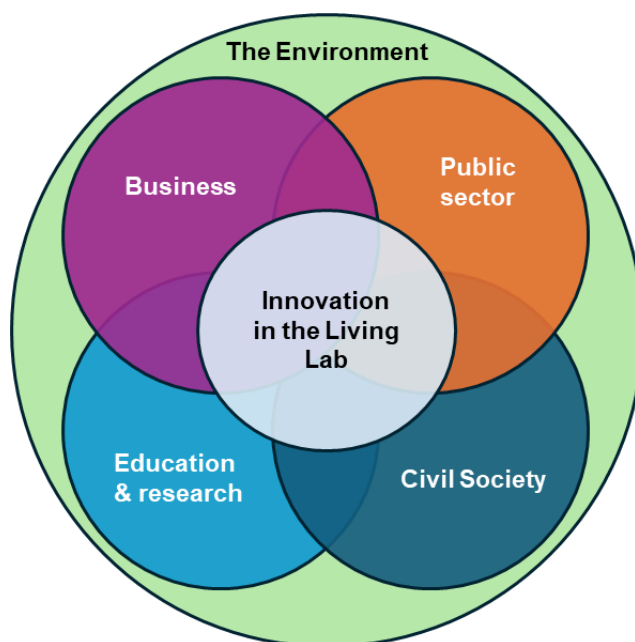


Figure 2.1: The quintuple helix innovation model used for the mapping of stakeholders actively engaged with the management and prevention of IAS within each Living Lab area, where the fifth ‘helix’ of the diagram is the natural environment (after Carayannis and Campbell, 2010).

In addition to drawing on existing knowledge of who these actors are, the stakeholder mapping was subsequently further extended by a snowballing technique (Fig. 2.2). Stakeholders already known to the local consortium partner were approached and invited to suggest other relevant stakeholder organisations or relevant contacts. This snowballing took place through a variety of mechanisms, including by email or telephone, and during in-person discussions at events.

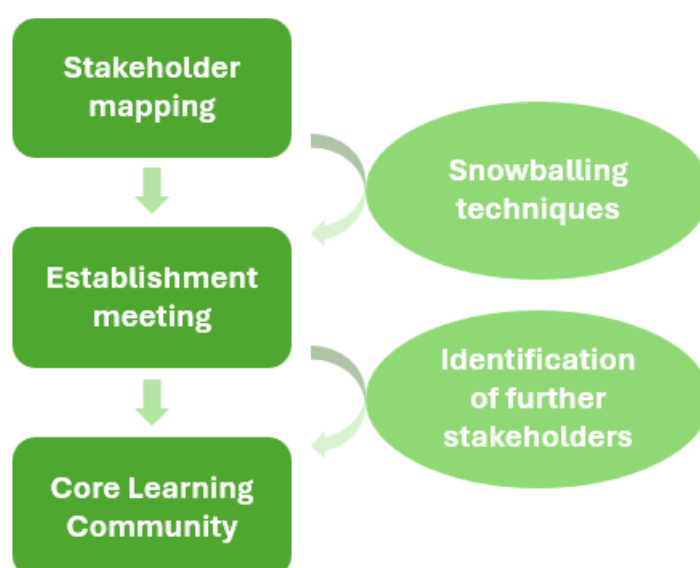




Figure 2.2: A flow diagram of the iterative process for identifying relevant stakeholders to participate in the local Living Lab and subsequently to form the core Learning Community.

Stakeholders identified through this process were invited to the first face-to-face meeting of the Living Lab within their local area. This provided an opportunity to learn more about the OneSTOP project and technologies to be tested, and to help identify key sampling sites and target species for the subsequent experimentation activities (**Task 3.2 Stakeholder experimentation through Living Labs**). Following the initial Living Lab meetings, interested individuals were invited to form a core Learning Community of between approximately 8-12 stakeholders. The core Learning Community sits at the heart of each Living Lab and remains active for the duration of the project. The core Learning Community contains representatives from a range of organisations such as local authorities and nature conservation charities, that have strong ties to members of the wider Living Lab community, such as site rangers, who may be involved in deploying the technologies on the ground (Fig. 2.3).

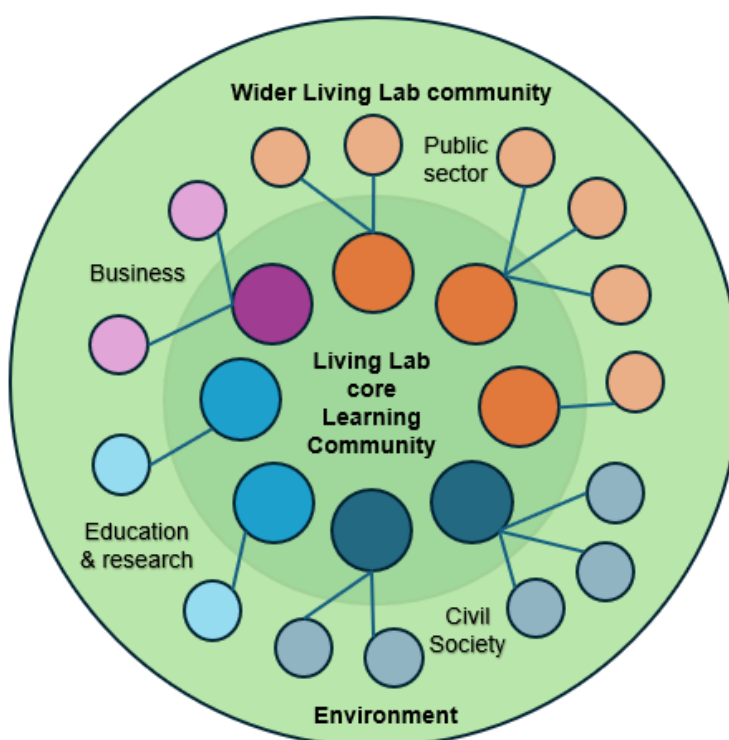


Figure 2.3: A diagrammatical representation of the core Learning Community at the heart of the Living Lab. Colors represent the different stakeholder groups including public sector (orange), business (purple), education & research (light blue) and civil society (dark blue).

The initial Living Lab meetings also provided another opportunity to identify further stakeholders where gaps existed to potentially extend the core Learning Community or contacts relevant to specific Living Lab planned activities. For example, the management of a key site of interest identified by the Living Lab in the United Kingdom was recently taken





D3.1 Living Labs Learning Community Mapping

over by a stakeholder that had not been identified by the initial mapping, and they were subsequently invited to participate in the core Learning Community going forward.

Each Living Lab consortium partner also considered which of the main types of stakes associated with each of the four categories of environmental, social, economic and regulatory (Table 2.1) were most relevant to their stakeholders.

Table 2.1: Examples of the types of stakes associated with IAS encountered by organisations within the Living Labs.

Type of stake	Interests	Examples
Environmental	Interests in recording and protecting native biodiversity, ecosystem health, and natural habitats.	Conservation and wildlife charities, landowners, biological records centres.
Economic	Interests in the financial impacts of IAS, such as agricultural or industrial losses and damage to infrastructure, and costs associated with their management.	Landowners, farmers, infrastructure and utilities providers (e.g. rail companies, water companies).
Social	Interests in human well-being and community health, accessing recreational opportunities and cultural heritage.	Community groups, heritage conservation charities, recreation providers.
Regulatory	Interests in influencing, developing or enforcing regulations for managing IAS and their spread.	Government bodies, regulators, policy lobby organisations.

Attendees at the first living lab meetings also completed a standardised baseline questionnaire to self-assess their existing levels of knowledge and influence regarding IAS, and their expectations for the project and technologies (Appendix 6.6). Results of this survey will be analysed and feed into **Task 3.4 (Living Lab Evaluation and Optimisation)**; here, however, we use the data received from the questions regarding stakeholder categories, focus on IAS work, their self-assessed expertise in IAS identification, detection and management as well as their perceived interest and influence.

To provide a clearer overview of stakeholders' roles and activities, they were mapped based on their influence on management actions and the impact of adopting OneSTOP detection techniques on their work. Influence was quantified by converting the responses to the following two questions into numerical values (0 to 4) and averaging those per stakeholder: *To what extent are you involved in decision-making related to IAS detection and management in your organization? (Not at all / Slightly / Moderately / Very / Extremely)* and *Do you have the authority or resources to influence the adoption of novel IAS detection technologies in or beyond your organization? (Not at all / Slightly / Moderately / Very / Extremely)*. Impact was derived by converting responses to the question *How do you expect your work to be affected by the adoption of the IAS detection techniques explored in this living lab? (Strongly negatively affected, somewhat negatively affected, not affected, somewhat positively affected, strongly positively affected)* to numerical values (-2 to 2) reflecting the degree to which stakeholders expected their work to be positively affected. These scores were aggregated





D3.1 Living Labs Learning Community Mapping

across all organisations, and the frequency of stakeholders in each influence and impact category was summarised. A bubble plot was then generated to display the distribution, with the y-axis representing influence, the x-axis representing impact, and bubble size proportional to the number of stakeholders in each category (see Section 3.1).

Data from the first three questions were analysed in Microsoft Excel and graphs generated (see Section 3.1). To visualise stakeholders' positions, survey responses to the baseline questionnaire were processed and recoded in RStudio (version 2023.06.0+421, "Mountain Hydrangea"; Posit Software, Boston, MA) using the **tidyverse** and **ggplot2** packages.

2.3 Key sampling sites and target species

Each of the Living Labs used their initial face-to-face meetings to identify key sampling sites and target species of interest to the stakeholders present. Most used a workshop approach, where stakeholders were able to use stickers on maps (e.g. Portugal) or sticky notes (e.g. Belgium, Finland, United Kingdom) to suggest species and/or locations suitable for trialling the technologies, and round table discussions to allow everyone to feed back on the suggestions and prioritise sites of interest. These were followed up online via email exchanges and through online shared working spaces, such as Microsoft Teams (United Kingdom) or LinkedIn (Belgium). The methods used by each Living Lab are detailed in the individual Living Lab reports in Section 3 below.





3. The OneSTOP Living Lab network

3.1 Overview of the OneSTOP Living Labs

Here we provide a short overview and comparative summary of the Living Labs' socio-economic and climatic settings, invasion status and the stakeholders involved. Further details regarding the individual Living Labs' contexts, stakeholder mapping activities and meetings, and their key sampling sites and target species, are provided in Sections 3.2-3.6 below, appearing in the chronological order that the Living Labs held their first meetings.

The Living Labs held their first meetings during the summer of 2025 (Table 3.1). All Living Labs are planning subsequent meetings for either late 2025 or early 2026.

3.1.1 Overview of the Living Labs' social-ecological settings

The locations of the Living Labs represent the wide range of different socio-economic conditions of Europe. The GDP varies across the Living Labs from 31 million Euros for the Sud-Est region of Romania to 106 million for the Helsinki-Uusimaa region in Finland, with corresponding variations in per capita GDP (Table 3.1.1).

Table 3.1.1: Comparative GDP in million Euros and GDP per capita for each of the NUTS2 regions associated with each Living Lab as of 2023. * Figures provided for the United Kingdom are an average of the values for the two regions that are represented in the Living Lab area and converted from GBP.

Living Lab	NUTS 2 region	GDP million Euros	GDP per capita as Purchasing Power Standard (PPS) per inhabitant
Belgium	Region de Bruxelles – Capitale/ Brussels Hoofdstedelijk Gewest	103 285	72 700
Finland	Helsinki-Uusimaa	106 660	50 000
Portugal	Norte	78 659.5	26 100
Romania	Sud-Est	31 360.2	23 300
United Kingdom*	Herefordshire, Worcestershire and Warwickshire / West Midlands	73130 (53 817 and 92 443 respectively)	34 430.5 (GDP per capita)

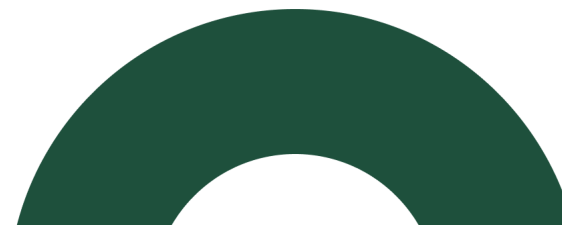




D3.1 Living Labs Learning Community Mapping

Table 3.1: Summary of the dates, locations and attendees at each of the first Living Lab establishment meetings held in 2025 listed in chronological order, the size of the core Learning Communities going forwards and the intended dates for second meetings.

Living Lab country	OneSTOP Partners	Meeting date	Meeting location	Total participants	External stakeholders	Core Learning Community going forwards	Provisional date of second meeting
Portugal	BIOPOLIS -CIBIO	08/05/25	Headquarters of Associação BIOPOLIS, Vila do Conde	41	36	28 individuals representing 11 organisations	February 2026
United Kingdom	CU, with UKCEH and PK	21/05/25	Centre for Agroecology, Water & Resilience, Coventry University	15	9	~18 individuals representing 9 organisations	November 2025
Romania	UOC	20/06/25	Faculty of Natural and Agricultural Sciences, Ovidius University of Constanța	25	20	~20 individuals representing 10 organizations	November 2025
Belgium	INBO & MBG	24/06/25	Meise Botanic Garden, Vlaamse Hoeve	19	11	8 individuals representing 7 organisations	October 2025
Finland	LUKE	14/08/25	Scandic Grand Central, Helsinki	12	8	9 individuals representing 9 organisations	January 2026





The Living Lab locations span a range of different climate conditions representative of Europe (Table 3.1.2; Fig. 3.1.1). Finland is the only country with a continental climate (D), with all other Living Lab countries classed as temperate (C). Portugal is the only country to have a defined dry season during the summer. Finland is the coldest country, with a mean national average of 2.46°C, and Portugal the warmest with a mean national average of 15.85°C. Finland has the least rainfall overall, with an average annual rainfall of 536mm, while the United Kingdom is the wettest, with 1220mm. However, individual Living Lab locations can deviate from these averages, for example, annual rainfall in Coventry, the location of the United Kingdom Living Lab is just 698 mm (Met Office, 2025).

Table 3.1.2: Comparative climate data for the five OneSTOP Living Lab countries.

Living Lab	Köppen climate classification	Mean national yearly temperature	Average national rainfall (mm/year)
Belgium	Cfb	10.67	847mm
Finland	Dfb	2.46	536mm
Portugal	Csa; Csb	15.85	854mm
Romania	Cfa	10.18	637mm
United Kingdom	Cfb	9.24	1220mm



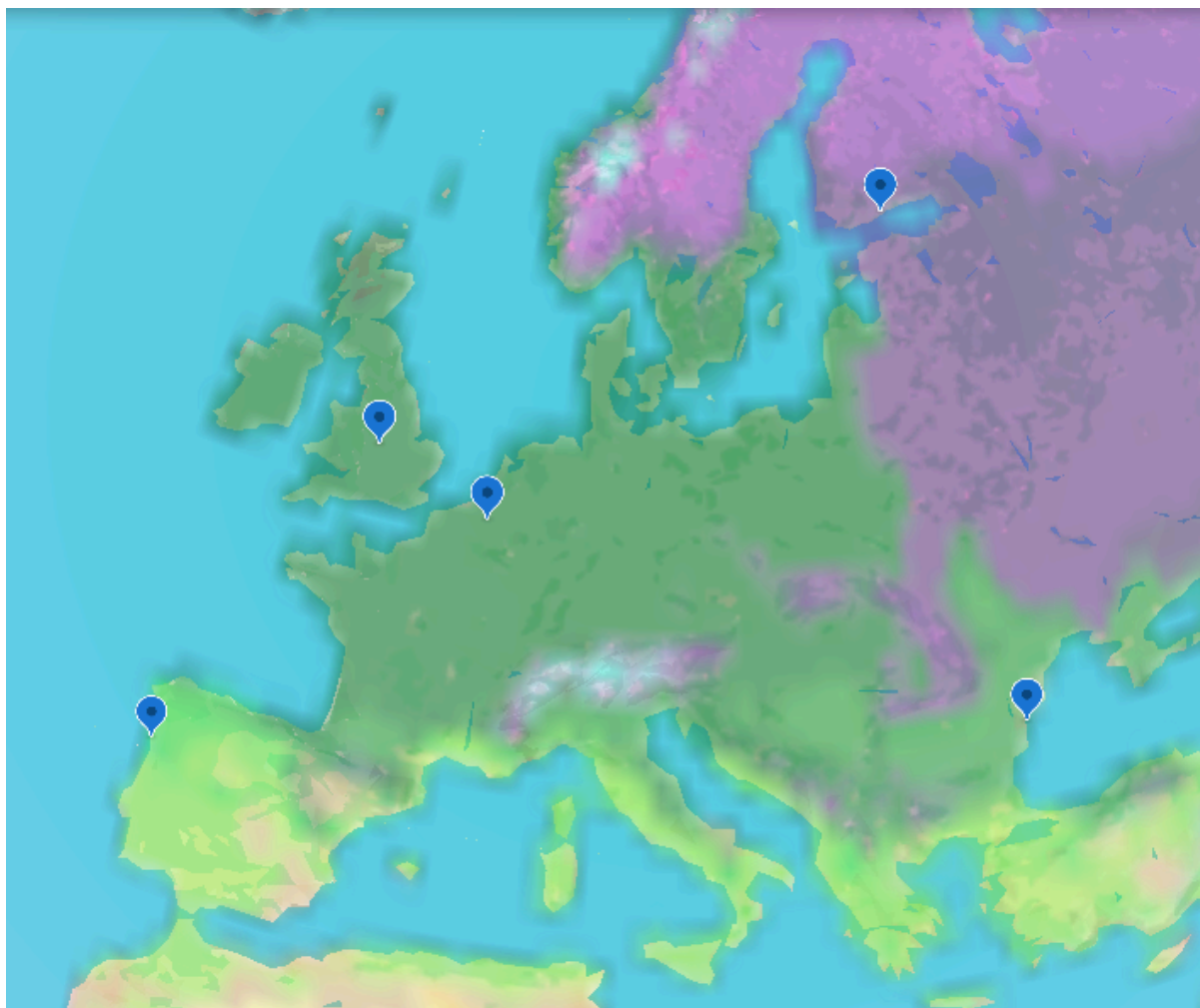


Figure 3.1.1: Map showing the five European Living Lab locations overlaid with the Köppen-Geiger climate map for the period 1986-2010 (Rubel et al. 2017). Green colours: temperate, purple colour: continental – see table 3.1.2 for details for each living lab.

Living Lab locations also vary in their geographic settings, although most embrace both urban metropolitan and rural areas. The United Kingdom Living Lab is the only one not to incorporate any coastal regions. All Living Lab locations include features considered to be key points of entry for the introduction and spread of IAS, i.e. infrastructure such as marine and inland ports, railways, canals and retail distribution hubs as well as botanical gardens (Table 3.1.3).





Table 3.1.3: Presence of potentially high-risk settings for the introduction and establishment of IAS in each Living Lab area (*Coventry airport no longer offers commercial flights)

Living Lab	Belgium	Finland	Portugal	Romania	United Kingdom
Marine port		x	x	x	
Inland port	x				
Airport	x	x	x	x	x*
Botanic garden	x	x	x		
Retail distribution hubs			x		x
Road infrastructure	x	x	x	x	x
Rail infrastructure	x	x	x	x	x
Canals	x				x

The five Living Lab locations have different numbers of IAS present. As of 2022, Belgium had the most IAS of Union concern present or established (44/88; Fig. 3.1.4), with half of the species on the list having been recorded there. England (for the United Kingdom) had the second highest proportion (41/88), although it has historically successfully eradicated several of the species (for example the coypu, *Myocastor coypus*, the muskrat *Ondatra zibethicus*, and the African clawed frog *Xenopus laevis*) and so they have been marked as not currently recorded. Portugal reported the third greatest proportion (28/88). Romania reported 22 out of the 88 species, and Finland had the fewest, with only nine of the 88 identified as present.

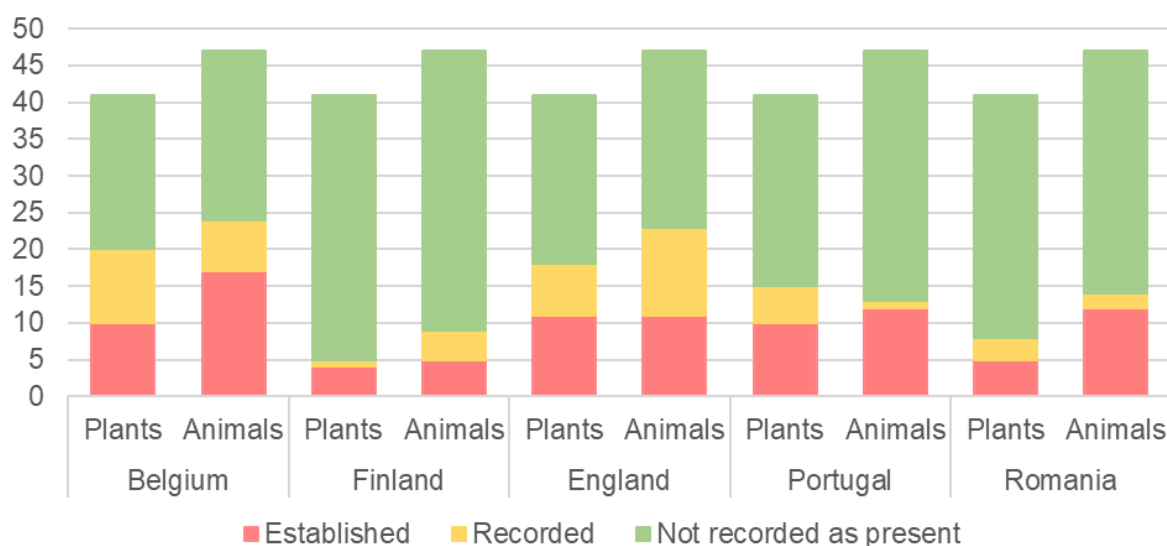


Figure 3.1.4: Proportion of the 41 plant species and 47 animal species on the list of invasive alien species of Union concern established, recorded or not currently recorded as present (but may have been historically eradicated) in each of the five OneSTOP Living Lab countries, as of 2022.





D3.1 Living Labs Learning Community Mapping

3.1.2 Overview of the Living Labs' stakeholders

Here we provide a brief overview of the stakeholders participating in the Living Labs based on data collected from the baseline questionnaire, completed by 83 respondents. For full details of the stakeholders identified by the mapping process see the subsequent sections below for individual tables provided by each Living Lab.

Stakeholders responding to the baseline questionnaire were mapped against the categories of the quintuple helix innovation model, where the fifth helix represents the wider natural environment. Business was least well represented overall, with only 7 respondents categorised as such, with Research and Education represented in quite different degrees across the Living Labs (22 respondents). Civil Society and Public Sector organisations were most represented (27 respondents each).

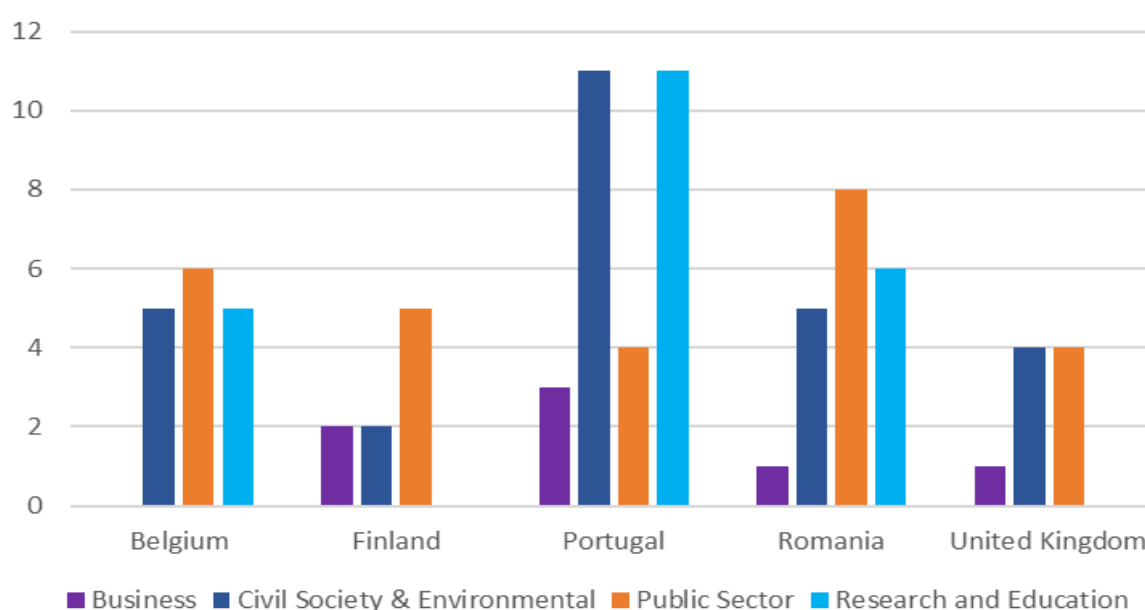


Figure 3.1.2: Stakeholders attending the first Living Lab meetings who completed the baseline questionnaire mapped against the categories of the quintuple helix innovation model, where the fifth helix represents the wider natural environment.

Many stakeholders involved in the Living Lab core Learning Communities have a focus on invasive plant species, with fewer working on invertebrates or mammals. However, some stakeholders work across all or a combination of these taxonomic groups (Figure 3.1.3).



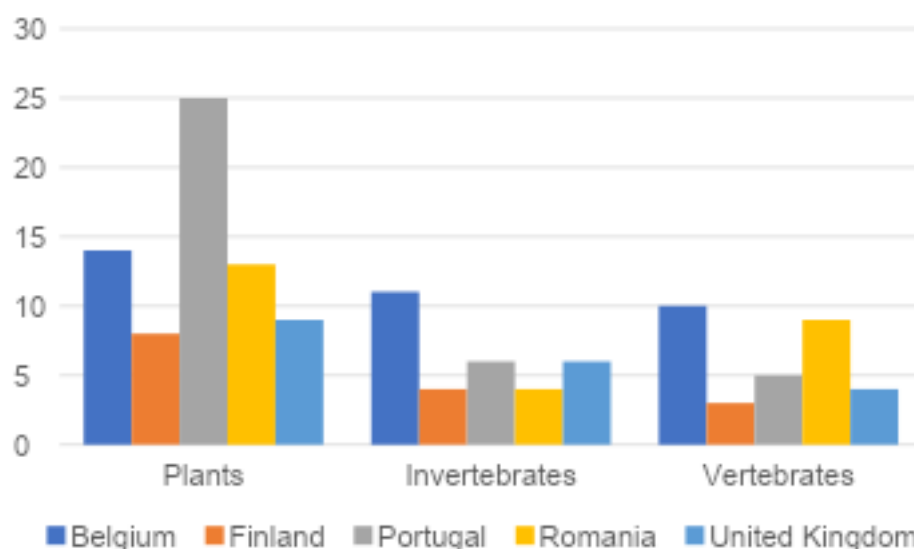


Figure 3.1.3: Stakeholder areas of focus across the Living Labs. Values on the y-axis represent the total number of stakeholders in the Living Lab selecting that category. Stakeholders could select as many categories as relevant. Some (3) stakeholders did not identify a focus on any of these groups.

More stakeholders self-assessed themselves as having no expertise or being beginners when it came to IAS management than for identification and detection. Levels of self-assessed expertise varied by country.

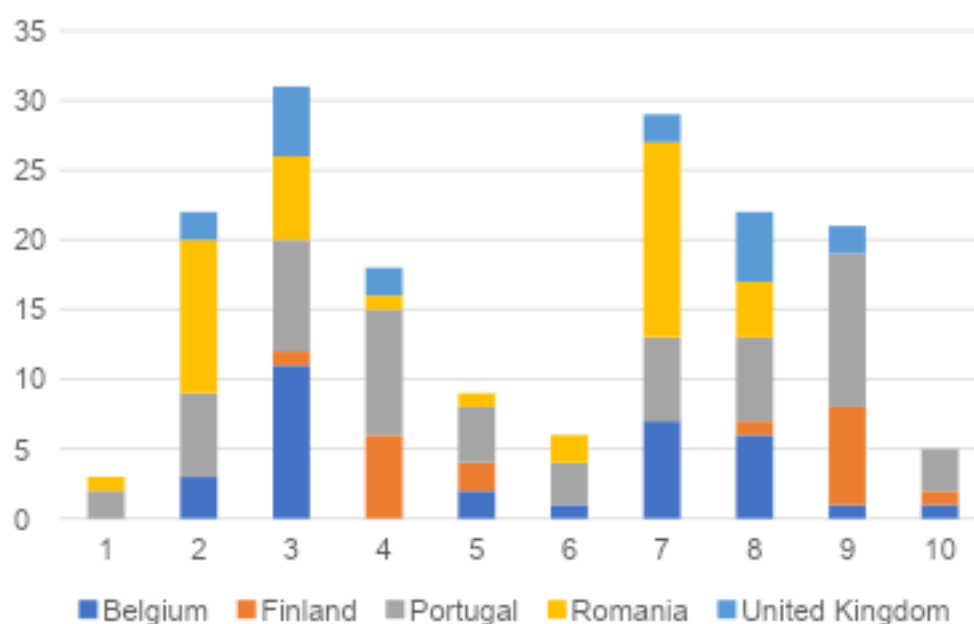


Figure 3.1.4: Self-assessed levels of expertise in IAS identification and detection and management among respondents to the Living Labs baseline questionnaire. Identification is abbreviated as ID.





D3.1 Living Labs Learning Community Mapping

Stakeholder core Learning Communities demonstrate a spread of responses with regards to both the potential impact of the OneSTOP technologies, and their potential as individuals to influence IAS management (Fig. 3.1.5). Most stakeholders rate the potential impact of the OneSTOP technologies as medium or high. Perceived influence appears widespread and likely reflects the range of roles and remits different stakeholders have within their organisations and wider regions in relation to IAS.

Most of the Living Labs felt their stakeholders' main stakes related to environmental, social or economic aspects of IAS, which likely reflects the regional level of interest or responsibility.



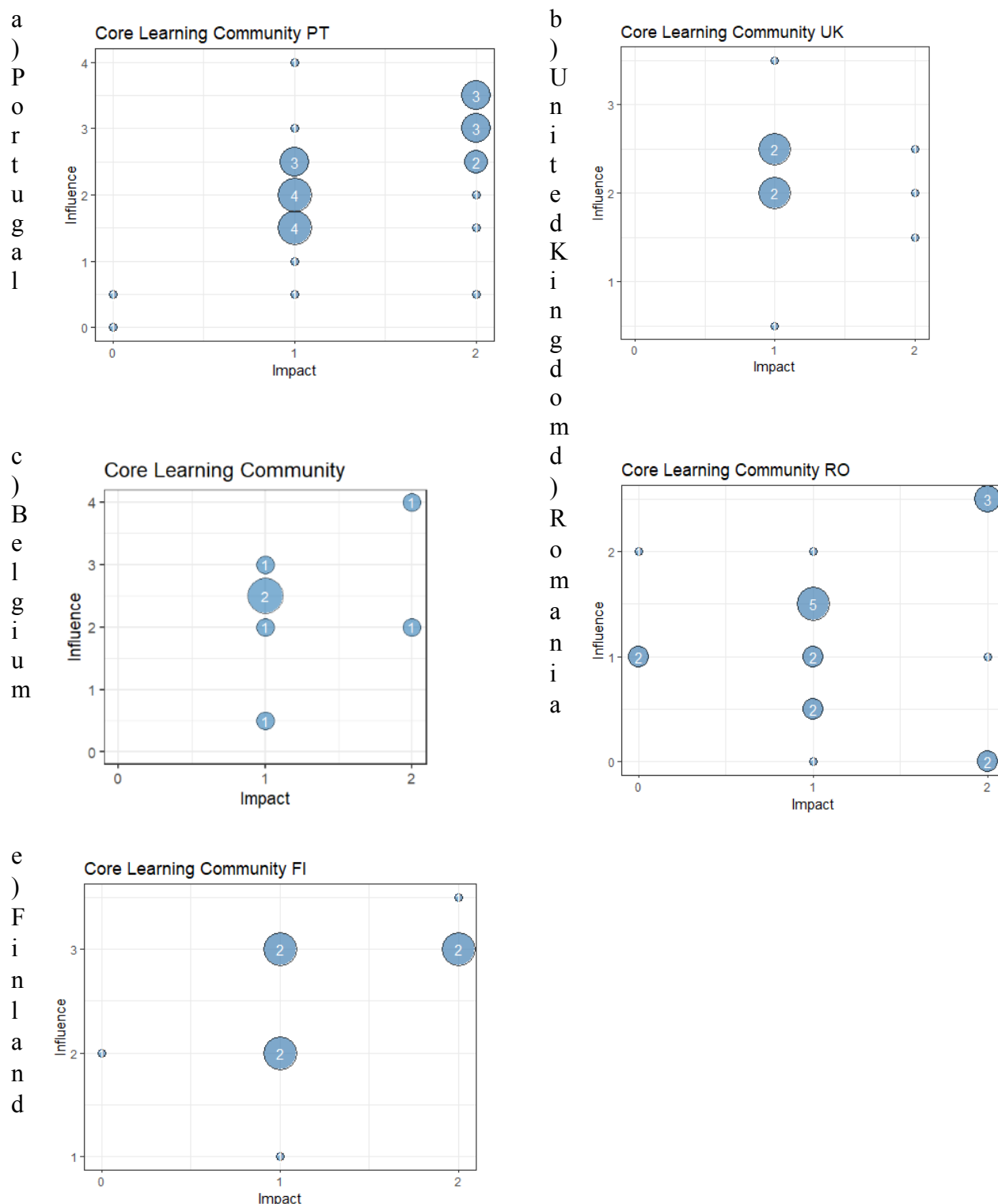


Figure 3.1.5. Bubble plots showing the distribution of stakeholders in the Living Labs, based on the extent that they can influence IAS management actions (y-axis) and the impact they expect the adoption of OneSTOP detection techniques would have on their work (x-axis). Bubble size reflects the number of stakeholders associated with each combination of influence and impact, with larger circles indicating a higher count. The numeric labels inside the bubbles show the exact number of stakeholders at that position.







D3.1 Living Labs Learning Community Mapping

3.1.3 Key sampling sites and target species

The Living Labs have identified a wide range of target sites and species relevant to their local areas to trial out the technologies with. Species range from invasive plants and animals to pests and diseases, demonstrating interest in the joined-up approach of OneHealth.

There is interest in using the CamAlien vehicle mounted camera system not only to map vegetation along roads but also on rivers, canals and other aquatic settings (e.g. Belgium, Finland, United Kingdom), and for a wide range of species. Several Living Labs were interested in using Cam Alien for trees, with the Belgian Living Lab keen to test it within forest settings, Uusimaa Living Lab interested in applications relevant to tree health, and in Portugal and the United Kingdom for mapping invasive trees such as *Ailanthus altissima* and *Acacia* species.

Some Living Lab participants demonstrate a preference for using metabarcoding approaches for the broad detection of species with the airDNA samplers (e.g. Finland, United Kingdom). There was also interest in using the technology to detect normally cryptic species such as the causal agents behind a range of plant and tree diseases, and for their use in monitoring potential high risk entry and distribution points such as ports and transport hubs.

The potential for the camera traps for the automated monitoring of insects (AMI Traps) to detect potential IAS either on arrival at ports or near distribution hubs, or to monitor the spread of species of concern to the Living Lab area from adjacent regions, for example the oak processionary moth *Thaumetopoea processionea* in the United Kingdom, were identified.





3.2 Portugal Living Lab

3.2.1 Social-ecological setting

The Portugal Living Lab is located in the northern part of Portugal, in southwestern Europe. Its geographical operational area corresponds to Portugal's NUTS II “Norte” (North) region.

The region's climate is Mediterranean, comprising both Warm-summer Mediterranean (Köppen: Csb) conditions, which dominate the western portion of the Living Lab area and are characterized by mild, wet winters and warm, dry summers, and Hot-summer Mediterranean (Köppen: Csa) conditions in the interior, particularly in the Douro Valley, a renowned wine-producing landscape where summers are hotter and drier.

Land use/land cover in the Living Lab region is diverse, with forests representing the dominant land cover (~32% of the total area), followed by agricultural areas (~29%) and shrublands (~26%). Artificial territories account for approximately 8% of the land area.

The region is home to 3,692,842 inhabitants (2024), making it the most populous of Portugal's NUTS II regions (INE, 2025). Norte comprises eight sub-regions (Intermunicipal Communities, NUTS III) with highly contrasting demographic profiles: population density ranges from 19.3 inhabitants per km² in Terras de Trás-os-Montes to 875.2 inhabitants per km² in the Porto Metropolitan Area (OECD, 2024). There is a marked contrast between the large, low-density and predominantly rural inland sub-regions (Alto Tâmega e Barroso, Douro, and Terras de Trás-os-Montes) and the more densely populated, industrialized, and mostly coastal sub-regions.

Rural depopulation and demographic ageing are pressing challenges that drive land abandonment and shifts in land cover, increasing wildfire risk and facilitating the establishment and spread of IAS.

The region also contains several high-risk settings for the introduction and establishment of biological invasions. These include major transport hubs (introduction pathways) such as the marine port of Leixões and Francisco Sá Carneiro International Airport, as well as extensive transportation infrastructure (highways, metro lines, and railways).

Norte features important biodiversity conservation areas, including Peneda-Gerês National Park — Portugal's only national park — which is part of the Gerês-Xurés Transboundary Biosphere Reserve and hosts several endemic and threatened species. Near the partner institution's headquarters (CIBIO-BIOPOLIS) lies the Vila do Conde Coastal Regional Protected Landscape and the Mindelo Ornithological Reserve, a protected area with historical significance as it was the first officially designated one in Portugal (established in 1957).

The governance of this socio-ecological system is complex, involving a wide range of stakeholders, including municipalities, forest owners' associations, protected-area authorities, and private-sector actors, which creates both challenges and opportunities for coordinated management.



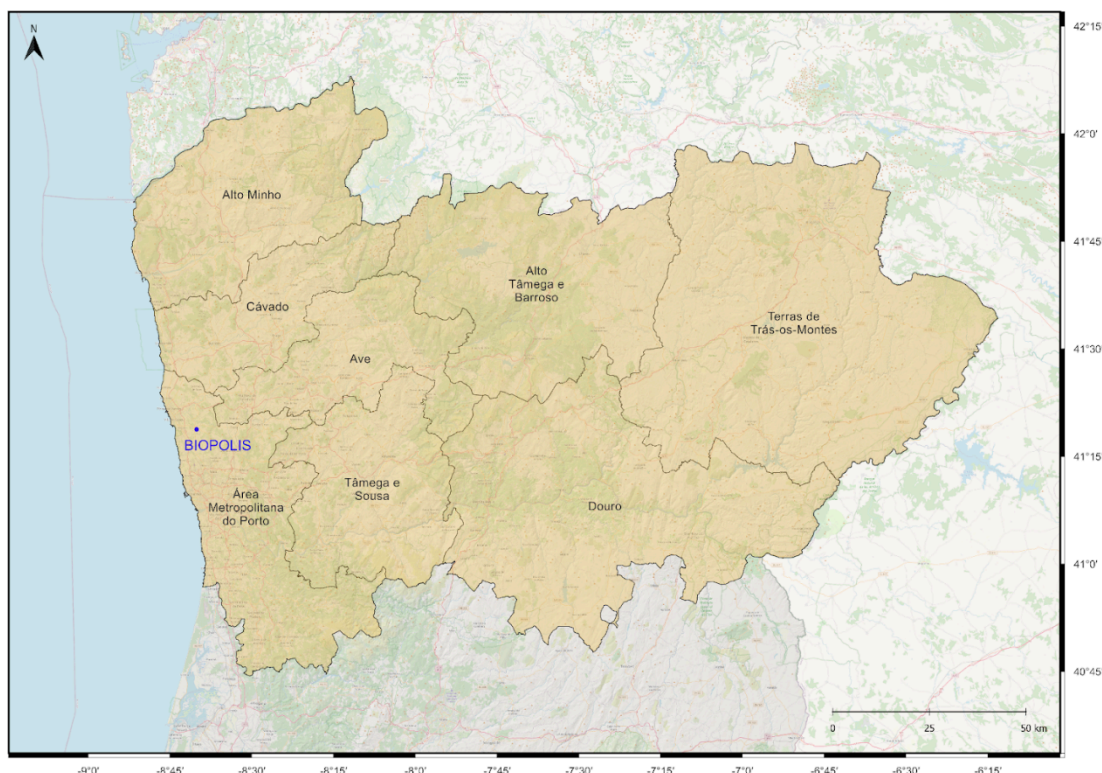


Figure 3.2.1: Map showing the geographical extent of the Portugal Living Lab (yellow shaded area), corresponding to the NUTS II “Norte” region. NUTS III subregions within the area are delineated with dashed lines. The map also highlights the location of the headquarters of the Portuguese OneSTOP partner institution, Associação BIOPOLIS.

3.2.2 Stakeholder mapping & formation of core Learning Community

Associação BIOPOLIS (BIOPOLIS-CIBIO), the OneSTOP project's regional partner, pinpointed and mapped the local and regional actors directly or indirectly involved in invasive alien species (IAS) management within the Living Lab area (Table X1). Following the quintuple helix innovation model, organisations were categorised as Research and Education, Public sector, Civil Society, Environment, or Business. Furthermore, a snowball sampling method was employed to expand this list: initial contacts were asked to recommend other pertinent stakeholder organizations.

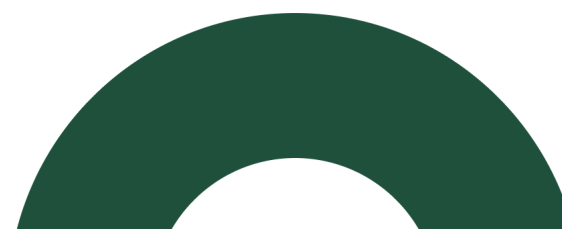


D3.1 Living Labs Learning Community Mapping



Table 3.2.1: Stakeholders identified by the Portugal Living Lab mapped to the helices of the quintuple helix innovation model. Organisations marked with an asterisk (*) form part of the Living Lab core Learning Community.

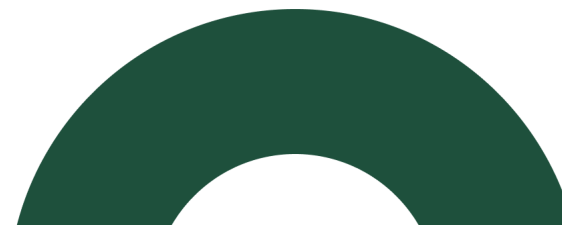
Stakeholder group:	Research & Education	Public Sector	Civil Society/ Environment	Business
Local (directly dealing with IAS, in the Living Lab area, representatives are in the core Living Lab group).	BIOPOLIS (CIBIO, Green-UP, INIAV, ICBAS)*	Vila do Conde Municipality *	Associação dos Amigos de Mindelo para a Defesa do Ambiente*	Lactogal
	IPVC *	Mindelo Parish Council	Associações dos Amigos do Rio Ovelha	Cooperativa Agrícola de Vila do Conde
		ICNF (Forest and Nature Institute) *	Associação Nativa	Norte Litoral Highway Agency
		Association of Municipalities Douro and Tâmega * (Protected Landscape of Aboboreira)	Associação Pé ante Pé	Metro Porto
		SEPNA - Guarda Nacional Republicana	VitaNativa	Ascendi Highways*
		Porto Municipality *	REBN *	Brisa Highways
			Laboratório da Paisagem *	E.Rio
			Centro do Clima da Póvoa de Varzim*	Floradata, Lda. *
				RAIZ - Navigator *
Regional/National (not directly involved in the Living Lab core group or active in the Living Lab area but important to keep informed)	University of Porto	Environment, Agriculture and Forestry Ministries	Quercus	REN (National Energy Network)





D3.1 Living Labs Learning Community Mapping

		Direcção Regional de Agricultura e Pescas do Norte	FSC Portugal	LightSource bp
		Agência Portuguesa do Ambiente		





D3.1 Living Labs Learning Community Mapping

Relevant stakeholders representing all five sectors of the quintuple helix innovation model were invited to an in-person workshop held on May 8, 2025, at the BIOPOLIS Association headquarters (Fig. 3.2.2). During the Living Lab workshop and in subsequent smaller meetings, additional stakeholders within the Living Lab area were identified and invited to participate in future meetings and activities.

The workshop included an interactive Mentimeter (www.mentimeter.com) exercise to explore participants' perceptions of biological invasions. This exercise involved sharing word associations, identifying IAS of concern in the region, expressing comfort levels regarding the eradication of different taxonomic groups, and outlining expectations for the Living Lab. A participatory mapping session further facilitated the sharing of local spatial knowledge among stakeholders. Together, they identified areas of: (a) IAS presence, (b) perceived impact, (c) management priority, and (d) potential detection and testing sites.

Workshop participants highlighted several priorities that reflect their expectations for establishing a successful Living Lab, including:

- Improved access to decision-support tools and technologies
- Strengthened collaboration and governance networks
- Enabling practical action and implementation
- Co-developing and sharing knowledge
- Engaging broader society and raising awareness



Figure 3.2.2: Group photo of the Portugal Living Lab participants.

From the workshop held at BIOPOLIS and subsequent meetings, a core Learning Community was identified to guide the Living Lab activities going forward. The core Learning





D3.1 Living Labs Learning Community Mapping

Community includes representatives from a variety of organisations spanning different stakeholder groups (marked with asterisks in Table 3.2.1). While representation across all sectors is balanced, Research and Education and Civil Society & Environment have a slightly higher number of representatives.

Two stakeholders, who were identified by other stakeholders or were unable to attend the initial workshop, subsequently joined the core Living Lab community following a separate meeting. A broader network of workshop attendees, while not part of the core Living Lab community, will engage in select activities as a satellite group.

While most Living Lab participants focus on a specific geographic area within its boundaries, some stakeholders have a broader scope of intervention. For instance, Ascendi manages highways beyond the Living Lab area and into adjacent regions. Similarly, the ICNF's responsibilities for managing and protecting Portugal's natural environment and resources extend from the local to the national level. The majority of participants are involved in recording and/or managing IAS in the Living Lab area, primarily with environmental, economic, or social interests.

3.2.3 Key sampling sites and target species

Sampling species and potential testing sites were identified during the workshop on May 8 through an interactive Mentimeter survey and mapping exercise. Each technology's potential target species and testing locations are currently being discussed in dedicated online meetings. For example, two online sessions were organized to coordinate the CamALIEN tests, select sampling sites, and facilitate experience sharing among stakeholders.

CamALIEN

The potential target species identified for CamALIEN include *Acacia dealbata*, *Acacia longifolia*, *Acacia melanoxylon*, *Ailanthus altissima*, *Arctotheca calendula*, *Arundo donax*, *Baccharis spicata*, *Carpobrotus edulis*, *Cortaderia selloana*, *Cotula coronopifolia*, *Eucalyptus globulus*, *Reynoutria japonica*, *Hakea decurrens*, *Phytolacca americana*, *Pittosporum undulatum*, *Robinia pseudoacacia*, and *Solanum mauritianum*.

Priority areas for surveys in Northern Portugal include main highways, municipal roads, Peneda Gerês National Park, and urban parks such as the Porto Urban Park, where invasive alien plants are commonly established. The timing, seasonality, coverage, prioritization, and logistics of surveys have been discussed in online meetings involving all stakeholders. Ascendi has expressed interest in expanding CamALIEN monitoring to include roadkill assessments.

AMITrap and AirDNA Sampler

Discussions regarding these two technologies will take place once they arrive at the Portugal Living Lab. However, two stakeholders — who work directly with insects and moths — have shown specific interest in testing these technologies. Their insights will assist in identifying target species and suitable sampling sites.





3.3 Coventry & Warwickshire Living Lab, United Kingdom

3.3.1 Social-ecological setting

The Coventry Living Lab is located within central England in the United Kingdom, in the west of Europe. Politically, it is the only living lab outside of the European Union, and it is the only location not connected to mainland Europe. It is classified under the Köppen climate classification as category Cfb, meaning it has a temperate climate, with no dry season and a warm summer.

The Coventry Living Lab includes the areas of Coventry, Warwickshire and Solihull, an area of some 80km at its longest North-South, and approximately 50km at its widest (Figure X.). It comprises parts of two NUTS2 regions, with the county of Warwickshire within the 'Herefordshire, Worcestershire and Warwickshire' region and Coventry and Solihull within the 'West Midlands' region (Herefordshire, Worcestershire and the rest of the West Midlands area other than Coventry and Solihull are outside the scope of the Living Lab area and are not reported on here).

At the heart of the Living Lab area is the city of Coventry, a metropolitan unitary authority with a population of approximately 350,000 people, located within the West Midlands. It also includes the unitary authority of Solihull, with a population of approximately 217,000, and the county of Warwickshire, which includes the towns of Nuneaton, Rugby and Leamington Spa, and has an estimated population of 623,000. Some areas, including Coventry, have lower than national life expectancy at birth (and with considerable variation between areas), and are more ethnically diverse (55.3% white as of 2021 Coventry City Council 2022), whereas other areas in Warwickshire have higher life expectancies at birth and a greater proportion of the population are white British than the national average (Warwickshire County Council 2022).

Much of Warwickshire consists of relatively flat, lowland countryside punctuated by towns and villages, and includes areas of green belt, which are designated zones protected from development around the urban areas of Coventry and Birmingham. Approximately 70% of land in Warwickshire is used for agricultural purposes. There is also a mixture of private gardens, local authority managed green spaces, commercial gardening centres, and gardeners.

There are multiple nature reserves and protected areas within the county, many of which are managed by Warwickshire Wildlife Trust, a local nature conservation charity, plus several Council-owned country parks and National Trust-managed heritage estates. There are also several rivers flowing through the area, with the Avon being the largest.

The Coventry Living Lab area includes multiple high-risk settings for introduction and establishment of IAS. These include a range of transportation infrastructure including key road and rail links, canals and navigable rivers, as well as associated large scale retail distribution hubs in several locations within the Living Lab area.





Figure 3.3.1: A map showing the area covered by the Coventry & Warwickshire Living Lab (denoted by the yellow shaded area), incorporating the unitary authorities of Coventry and Solihull and the county of Warwickshire.

3.3.2 Stakeholder mapping & formation of core Learning Community

Coventry University, the local consortium partner for the OneSTOP project, identified and mapped the local and regional actors already actively engaged with the prevention and management of IAS within the Living Lab area (Table 3.3.1). Groups and organisations known to the research team were identified as being either local or regional actors, and categorised as Research and education, Public sector, Civil Society or Business. In addition, this was further informed by a snowballing technique: those already identified were approached and invited to suggest other relevant stakeholder organisations.

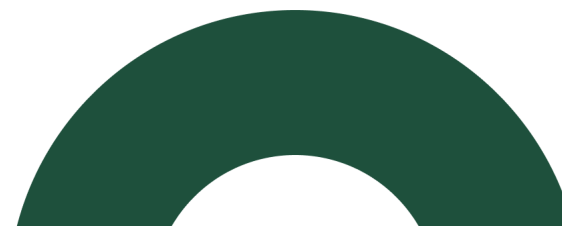




D3.1 Living Labs Learning Community Mapping

Table 3.3.1. Local and regional actors with a stake in the prevention and management of invasive alien species within the UK Living Lab area, categorised by type (Research and education; Public sector; Civil Society; Business). An asterisk (*) denotes organisations currently represented in the Living Lab core Learning Community.

Stakeholder group:	Research & Education	Public Sector	Civil Society	Business
Local (directly dealing with IAS, in the Living Lab area, representatives are in the core Living Lab group)	Coventry University*	Coventry City Council*	Warwickshire Wildlife Trust (also managing local volunteer groups)*	Severn Trent Water*
		Warwickshire County Council*	Warwickshire Flora Group (Botanical Society for Britain and Ireland)*	
		Environment Agency*	Canal and Rivers Trust*	
Other potential local stakeholders	University of Warwick	Highways Agency	National Trust	IAS management companies (e.g. Knotweed Company)
				Network Rail
				Ecological consultancies
Regional/National (not directly involved in the Living Lab core group or active in the Living Lab area but important to keep informed)		GB Non-Native Species Secretariat		
		Non-Native Species Inspectorate		
		Defra (Department of environment, food and rural affairs)		
		Natural England		





D3.1 Living Labs Learning Community Mapping

Relevant local stakeholders identified through the mapping activity were invited to attend a face-to-face establishment meeting for the Living Lab on 21 May 2025. At the Living Lab meeting and through online discussions afterwards, further potential stakeholders within the Living Lab area were identified, and some contacted with regards to participating in future Living Lab meetings and activities. These included a Civil Society organisation who had recently taken over management of a site in Coventry where IAS are being actively controlled, and a representative has been identified and invited to the next Living Lab meeting. Discussions are ongoing with regards to securing stakeholders from the regional rail and road networks, and a contact for a distribution hub has been identified by a Living Lab member.

From the face-to-face meeting and subsequent discussions, a core Learning Community was identified to guide the Living Lab activities going forward. The core Learning Community comprises a range of representatives from organisations across the different stakeholder groups (see the highlighted boxes in Table 3.3.1). Public sector and civil society organisations are quite well represented within the core group.

Most of the Living Lab participants have responsibility for a defined geographic area within the scope of the Living Lab (either Coventry or Warwickshire, or both), whereas some operate over a larger region, such as the West Midlands. Most have a role in recording and/or managing IAS within the Living Lab area, and their stakes can mainly be described as environmental, economic or social.



Figure 3.3.2: Attendees at the first Coventry & Warwickshire Living Lab meeting discuss the next steps and timeline for the OneSTOP Project





Figure 3.3.3: Some participants at the first Coventry and Warwickshire Living Lab meeting pose with a Biota Trace airDNA sampler from Platform Kinetic.

3.3.3 Key sampling sites and target species

Key sampling sites and target species of interest to the Living Lab were identified through a round table discussion at the Living Lab meeting and follow-up emails to the core learning community. Participants also expressed an interest in using the different technologies together in the same sites to compare results.

Some of the ideas the Living Lab members indicated an interest in exploring with the technologies and innovations included:

- Co-location of the OneSTOP technologies at the same site(s), and potentially with additional technologies or methodologies for comparison.
- Using the OneSTOP technologies to engage with visitors to their sites.
- Using the OneSTOP technologies to engage with the public and raise awareness of IAS while collecting valuable records as part of the next City Nature Challenge in April 2026.
- Placing the airDNA samplers and the AMI Trap at a mixed ownership/management site in Coventry with known IAS being managed on site.

CamAlien





D3.1 Living Labs Learning Community Mapping

- Using CamAlien to map invasive plants along main roads and motorways that are difficult or unsafe to survey using traditional methods.
- Using CamAlien to survey for the invasive tree of heaven *Ailanthus altissima* around the Coventry Ring Road and along county roads to map its distribution.
- Using CamAlien mounted on a canal boat to survey vegetation along areas with difficult to access tow paths, potentially along with airDNA collection along route. This may be able to tie into existing maintenance trips.
- Potentially using CamAlien along a greenway (a former railway line) to look for garden escapers like *Lamium galeobdolon subsp. argentatum*.
- Co-location of airDNA samplers and the AMI Trap at a site with good existing species records to compare against.

AMI Trap

- Running the AMI Trap at a local Council-run country park which has regular monthly moth trapping nights, and therefore good records, and at nearby site managed for butterflies and other invertebrates.

AirDNA sampler

- Placing the airDNA samplers and potentially the AMI Trap at a local transport distribution hub to monitor for species or DNA arriving with imports or distributed goods.

Due to the nature of the landscape and the remit of the Living Lab partners, there was also interest in freshwater aquatic and riparian species, demonstrating some overlap with the remit of the sister project GuardIAS.





3.4 Belgium Living Lab

3.4.1 Social-ecological setting

The Belgium Living Lab covers the entire country and is almost completely classified under the Köppen-Geiger climate classification Cfb, indicating a temperate climate with no dry season and warm summers. The Living Lab includes the administrative regions of Flanders, Wallonia and the Brussels-Capital Region, covering an area of 30,689 km². It encompasses both major urban and rural areas, representing a diverse mix of landscapes, population densities (≈ 380 people per km²) and socio-economic contexts (Biodiversity Information System for Europe, n.d.). There are strong regional differences: Flanders is Dutch-speaking, Brussels is bilingual and highly international and Wallonia is predominantly French-speaking, with a small German-speaking community. These differences are also reflected in governance structures, land-use policies, biodiversity regulations and stakeholder priorities (Biodiversity Information System for Europe, 2020).

Belgium's landscape is a mix of urban, suburban and agricultural areas, forests and nature reserves. Approximately 44% of the country's land is used for agriculture, while the remaining area consists of forests, grasslands, private gardens, public parks and other fragmented green spaces. Urbanisation is high, with residential lands accounting for about 9% (Statbel, 2025). Currently 14.7% of Belgium's terrestrial area is designated as protected (Biodiversity Information System for Europe, n.d.), managed by regional authorities, such as [the Agency for Nature and Forests](#) (Flanders) and the [Department of Nature and Forests](#) (Wallonia) as well as by NGOs, such as [Natuurpunt](#) (Flanders) and [Natagora](#) (Wallonia)). Belgium also has a strong tradition of participatory governance, using public consultations and involving NGOs and citizens in shaping biodiversity and nature policies (Institute of Natural Sciences, 2025).

Geographically, Belgium is divided into three principal regions: the coastal plains (sand dunes and polders), the central plateau (valleys and gorges) and the Ardennes (a rocky, forested plateau in the southeast) (Biodiversity Information System for Europe, n.d.). Major rivers, including the Meuse, Scheldt, Oise, Semois, Leie and Sambre, flow through the country, forming important ecological corridors (Pariona "Major Rivers Of Belgium", 2017).

Belgium has 317 species and 59 habitats protected under EU law (Biodiversity Information System for Europe, n.d.). However, the country also includes multiple high-risk pathways for the introduction and establishment of invasive alien species (IAS), including international trade, gardening and horticulture, the pet trade, extensive transport infrastructure (roads, railways, canals, ports, airports) and waterway systems (Belgian Forum on Invasive Species, n.d.). These conditions make Belgium an important test case for exploring and implementing novel IAS detection techniques as part of the OneSTOP project.





Figure 3.4.1: Map showing the locations of the Belgium Living Lab Core Learning Community: RATO vzw, Province of East Flanders, Brussels Environment, Brabantse Wouden National Park, Province of Flemish Brabant, Natuurwerk vzw, and Bosgroep Limburg.

3.4.2 Stakeholder mapping & formation of core Learning Community

Meise Botanic Garden (MBG) and the Research Institute for Nature and Forest (INBO), both local consortium partners for the OneSTOP project, identified and mapped the actors already actively engaged with the prevention and management of IAS in Belgium (Table 3.4.1). Known groups and organisations were classified into four categories: Research and education, Public sector, Civil Society or Business. Following the initial identification of stakeholders, a snowballing approach was used during the introductory Living Lab meeting, inviting stakeholders that were already identified to suggest other relevant organisations. In addition, an invitation to join the Living Lab was sent via email to members of the Flemish working group on IAS, and this invitation was reiterated in person during the group's annual meeting.

Relevant stakeholders identified through the initial mapping activity were invited to attend an in-person, introductory Living Lab meeting at Meise Botanic Garden on the 24th of June 2025 (see Appendix 6.3). The public sector and civil society (NGOs) were well represented during this first meeting. While stakeholders from the Research and Education and Business





D3.1 Living Labs Learning Community Mapping

sectors outside of the OneSTOP consortium were unable to participate in the first Living Lab session, we hope that some of them may be able to attend future sessions.

All stakeholders were asked to fill in the baseline survey. As part of this survey, respondents could also suggest additional potential stakeholders in Belgium and they could indicate whether they would like to be part of the core Learning Community. The latter question was posed after an introduction of the project and an explanation of the Living Lab concept. The survey was completed by 16 participants, among them two internal OneSTOP members from MBG involved in other WPs, three participants from INBO, and representatives from seven additional organisations.

Besides the baseline survey, participants also took part in an interactive Mentimeter exercise designed to explore their perceptions of biological invasions. During this activity, participants shared word associations, identified IAS of regional concern, and indicated the focus of their IAS work.

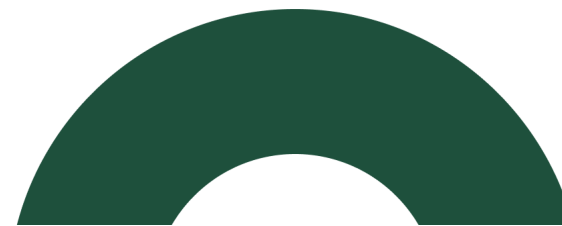
A total of eight stakeholders representing seven organisations expressed interest in joining the Core Learning Community (indicated by an asterisk in Table 3.4.1 and Figure 3.4.1). They include a mix of regional NGOs (RATO, Natuurwerk, Bosgroep Limburg) and public sector agencies (Brussels Environment, Province of East Flanders, Province of Flemish Brabant, Brabantse Wouden National Park). All Core group members are directly involved in coordinating or implementing IAS management at the regional level and consider IAS detection technologies relevant to their current roles. Six of the Core Community organisations are based in Flanders (Figure 3.4.1), while one is located in the Brussels-Capital Region. Future Living Lab sessions also aim to include representatives from Wallonia, who were unable to attend the first session. In contrast to the other Living Labs, the Belgium Lab encompasses the entire country. As such, INBO and MBG initially sought to include mostly regional and national stakeholders. For future tests and sessions, local stakeholders are and will be engaged through the existing regional and national contacts within the Living Lab. For example, the Huizingen Provincial Domain and the Zwin Nature Park were contacted by the Living Lab partners “Province of Flemish Brabant” and “Province of West Flanders”, respectively, to facilitate local testing of the AMI trap.





Table 3.4.1. Potential Living Lab stakeholders in Belgium with a role in the prevention and management of invasive alien species, mapped against four of the five strands of the quintuple helix innovation model: Research and Education, Public Sector, Civil Society, and Business. Total invited stakeholder organisations: 24; total participants present at the first Living Lab: 18; total core Living Lab community: 8 individuals representing 7 organisations, denoted with an asterisk.

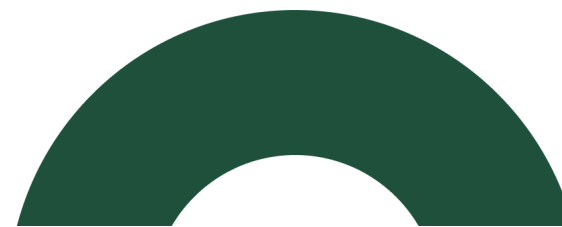
Stakeholder group:	Research & Education	Public Sector	Civil Society	Business
Regional and National (directly dealing with IAS, in the Living Lab area, representatives are in the core Living Lab group)		INBO	RATO VZW*	
		MBG	Natuurwerk VZW*	
		Province of East Flanders*		
		Province of Flemish Brabant*		
		Brussels Environment*		
Local stakeholders		Brabantse Wouden National Park*	Bosgroep Limburg*	
Other potential stakeholders	Walloon Agriculture Research Centre (CRAW)	Flemish Agency for Nature and Forests (ANB)	Natuurpunt	
		Flemish Environment Agency (VMM)	MijnTuinlab	
		National Scientific Secretariat on Invasive Alien Species (NSSIAS)	VELT	





D3.1 Living Labs Learning Community Mapping

		Belgian Biodiversity Platform (BBPF)		
		De Vlaamse Waterweg		
		Flemish Agency for Roads and Traffic (AWV)		
		Province of Antwerp		
		Province of Limburg		
		FPS Public Health		
		Département de l'Étude du Milieu Naturel et Agricole		
		Bosland National Park		





3.4.3 Key sampling sites and target species

During the Living Lab session, participants were invited to reflect on priority species and locations for testing the novel detection tools. We asked the following guiding questions: Where would you like to test the CamAlien? Which plant species would you hope to detect with the CamAlien? Where would you like to test the AMI trap? Which moth species would you hope to detect with the AMI trap? Where would you like to test IAS detection using airborne eDNA? Which fungi, insect, or plant species would you hope to detect using airborne eDNA?

To support this exercise, a map of Belgium was provided on which participants could place sticky notes to indicate areas they considered important for the deployment of the CamAlien and the AMI trap (Fig. 3.4.2; Fig. 3.4.3).

Participants indicated their five most concerning IAS: Giant hogweed (*Heracleum mantegazzianum*), Japanese knotweed (*Reynoutria japonica*), Asian hornet (*Vespa velutina*), Chinese mitten crab (*Eriocheir sinensis*), and Chinese muntjac (*Muntiacus reevesi*). Other species such as New Zealand pigmyweed (*Crassula helmsii*), Himalayan balsam (*Impatiens glandulifera*), Red swamp crayfish (*Procambarus clarkii*), and Asian tiger mosquito (*Aedes albopictus*) were also mentioned.



Figure 3.4.2: Participants during the first Belgium Living Lab workshop

CamAlien





D3.1 Living Labs Learning Community Mapping

For the CamAlien, participants suggested testing along both navigable and non-navigable provincial waterways, as well as in forests and along roadways where they are aware of specific IAS, such as Japanese knotweed, being present. Target species of interest included Japanese knotweed (*Reynoutria japonica*), giant hogweed (*Heracleum mantegazzianum*), Himalayan balsam (*Impatiens glandulifera*), and bamboo. Additional aquatic and riparian IAS of interest were mentioned, such as water pennyworts (*Hydrocotyle spp.*), parrot's feather (*Myriophyllum aquaticum*), water primrose (*Ludwigia grandiflora*), common water hyacinth (*Pontederia crassipes*), yellow skunk cabbage (*Lysichiton americanus*), common milkweed (*Asclepias syriaca*), *Baccharis halimifolia*, water lettuce (*Pistia stratiotes*), and watermosses (*Salvinia spp.*). The CamAlien was discussed as a potential early-warning tool, with clear relevance for species listed under the EU Regulation on Invasive Alien Species as well as for species of concern on regional lists. Waterways were considered particularly suitable for monitoring via kayak, canoe, Zodiac, or small boats, as well as along riverbanks visible from adjacent roads and gardens.

In forested areas, especially those in the province of Limburg, participants highlighted the importance of monitoring invasive *Prunus serotina*, which turns bright yellow in autumn, making it easier to detect. Testing the CamAlien in accessible forest edges, rides, and firebreaks was recommended, with the goal of rapid data collection and processing to support timely management. Participants also suggested surveying dominant native tree stands, such as aspen (*Populus tremula*), Scots pine (*Pinus sylvestris*), oak (*Quercus spp.*), and birch (*Betula spp.*), because it would be informative to examine which IAS are associated with such native stands.

Potential collaboration with the Flemish Environment Agency (VMM) was noted, particularly to integrate water plant monitoring into CamAlien surveys. Pilot workshops were suggested, where Living Lab members could test the tool collectively in the field, for example along the Damse Vaart or in other selected provincial waterways. The first large-scale CamAlien field test in forests is foreseen for autumn 2025.

AMI trap

Suggested sites for the AMI trap included areas that can be secured or monitored over time, such as controlled overflow areas (GOG Elsemheide, GOG Bierebeek), provincial domains in Flemish Brabant (e.g. Diest), the green roof of the Provincial Center for Environmental Research in Ghent, Bokrijk arboretum, and enclosed greenhouses. Ports such as Antwerp and Ghent were also identified as critical introduction points for invasive moths.

Target species included box tree moth (*Cydalima perspectalis*), a major concern due to pesticide use, oak processionary (*Thaumetopoea processionea*) and potentially the Asian tiger mosquito (*Aedes albopictus*), provided that it responds to light traps. Participants stressed the value of sharing data collected with the AMI trap and suggested sending a follow-up to stakeholders to map additional sites and interest in deploying the trap.

AirDNA sampler

Airborne eDNA sampling was considered a promising but more experimental technology. Suggested test sites included Willebroek and Bokrijk. Participants proposed a wide range of





D3.1 Living Labs Learning Community Mapping

potential target species, with a focus on terrestrial mammals that are difficult to detect using conventional methods. These included the Siberian chipmunk (*Tamias sibiricus*), invasive squirrels in general, raccoon (*Procyon lotor*), Chinese muntjac (*Muntiacus reevesi*), coypu (*Myocastor coypus*), and possibly invasive snakes and raccoon dogs (*Nyctereutes procyonoides*).

In addition to mammals, participants highlighted a number of invasive and problematic plant species as potential detection targets, such as parrot's feather (*Myriophyllum aquaticum*), floating pennywort (*Hydrocotyle ranunculoides*), Japanese knotweed (*Reynoutria japonica*), giant hogweed (*Heracleum mantegazzianum*), and Himalayan balsam (*Impatiens glandulifera*). Emerging tree diseases and forest pests were also mentioned, including “sudden oak death” (*Phytophthora ramorum*), bark beetle infestations, and other novel pathogens.

Deployment of airborne eDNA samplers is foreseen at a later stage in the OneSTOP project. The first tests are planned in collaboration with UK partners, and results are expected to be shared with stakeholders in 2026 following validation.

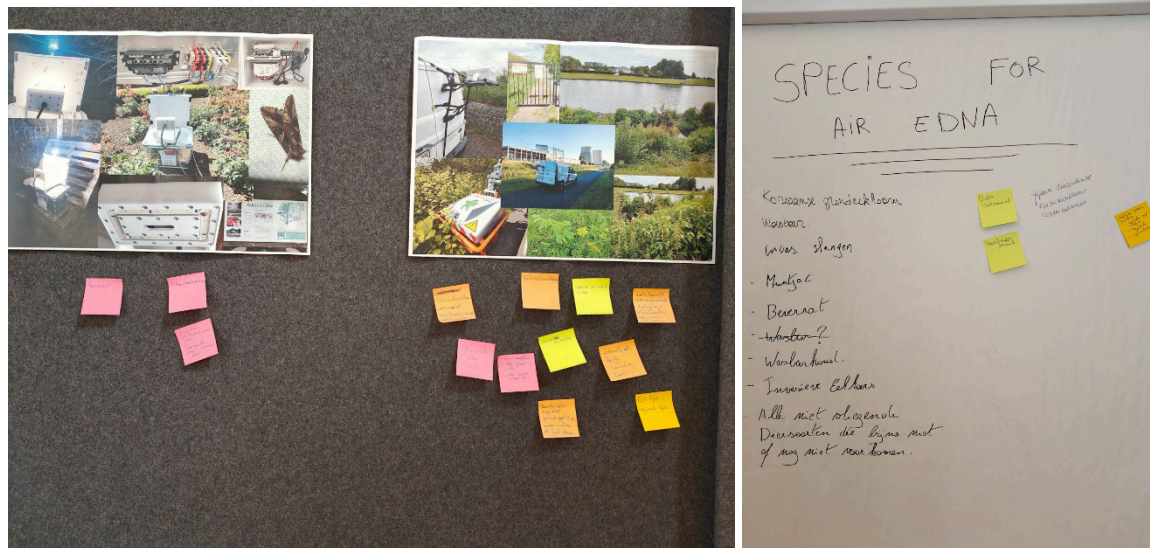


Figure 3.4.3: Interactive workshop at the first Belgium Living Lab, identifying target IAS deployment plans





3.5 Constanta Living Lab, Romania

3.5.1 Social-ecological setting

The Romania Living Lab is located in the Dobrogea region of Romania, in the eastern part of continental Europe. Geographically, the region is bordered by the Danube River to the west, the Black Sea to the east, Ukraine to the north, and Bulgaria to the south. Dobrogea extends approximately 200 km from north to south and about 100 km from east to west (Figure 3.5.1), encompassing both the Dobrogea Plateau and deltaic areas of the Danube (Rey et al., 2007). From an administrative perspective, it includes the counties of Constanta and Tulcea, part of the NUTS II South-East region (RO22). The Living Lab is located in the city of Constanta, the capital of Constanta county and Romania's largest port.



Figure 3.5.1: Dobrogea region of Romania (yellow) is shown together with its two NUTS III subregions, Constanta and Tulcea, indicated with dashed boundaries. The map also points out the headquarters of the Romanian OneSTOP partner institution at Ovidius University of Constanta (UOC).

Dobrogea has a humid subtropical climate (Cfa, Köppen classification), characterized by hot, humid summers and mild, rainy winters (Rey et al., 2007). Landscapes are diverse, ranging from flat lowlands and hilly plateaus inland to a coastline with sandy beaches, cliffs, and lagoons. Approximately 65% of the land is used for agriculture, dominated by cereal crops, vineyards, and sunflower cultivation. The region has an estimated population of around 848,000 inhabitants, more than 75% living in Constanta County. Therefore, Constanta County has a population density of about 92 inhabitants per km², reflecting the concentration of population and economic activity in coastal urban centers, while Tulcea County has a much lower density, about 23 inhabitants per km², consistent with its rural profile and the





D3.1 Living Labs Learning Community Mapping

extensive natural landscapes of the Danube Delta (CityPopulation.de, 2024). The demographic gradient in Dobrogea reflects its spatial heterogeneity, combining a densely populated, economically dynamic coastal zone with lightly populated inland and deltaic areas of high conservation value. Dobrogea hosts unique biodiversity and several protected areas, including multiple Natura 2000 sites, e.g. the Macin Mountains National Park, Cheile Dobrogei, Canaraua Fetei, and Razim–Sinoe coastal lagoons, part of the Danube Delta, a UNESCO World Heritage Site and Biosphere Reserve (Stanciu et al., 2023).

At the same time, the region comprises several high-risk settings for the introduction and establishment of invasive alien species (IAS). Key pathways include international maritime transport routes through the Port of Constanta, the Danube–Black Sea Canal, inland waterways, major rail and road networks, and tourism hubs along the coast. These routes facilitate both deliberate and accidental introductions of IAS, making Dobrogea a biodiversity hotspot and a key entry point for IAS in Romania and the wider Black Sea basin (Anastasiu et al., 2011; Preda et al., 2012, Memedemin et al. 2016).

3.5.2 Stakeholder mapping & formation of core Learning Community

Ovidius University of Constanta (UOC), the local consortium member for the OneSTOP project, identified and mapped the main local and regional actors engaged in IAS prevention and management within the Living Lab area (Table 3.5.1). Stakeholders were included in one of the following categories: Research and Education, Public Sector, Civil Society, and Business. The initial list of organisations was based upon the expertise of the Romanian team and subsequently expanded using the snowballing technique, in which identified stakeholders recommended additional relevant actors, thereby increasing the network for future Living Lab activities.

Key stakeholders were invited to the first meeting of OneSTOP's Romania Living Lab on June 20th, 2025, hosted by UOC at the Faculty of Natural and Agricultural Sciences in Constanta. During the meeting and subsequent discussions, additional stakeholders were identified and later contacted to engage their support in future activities.

Following the first meeting, a core Learning Community was established to guide Living Lab activities. This group includes representatives from all stakeholder categories (see Table 3.5.1, highlighted with asterisks). Public Sector and Research and Education are well represented, while the participation of NGO's has provided a broader range of perspectives within the group. Most participants hold responsibilities within specific geographic areas of Dobrogea, while others operate at broader scales, including county-level or national jurisdictions. The majority are engaged in recording, monitoring, or managing IAS within their respective areas. Their interests and stakes span environmental, economic, and social dimensions, reflecting the diverse expertise and perspectives represented within the core Learning Community.

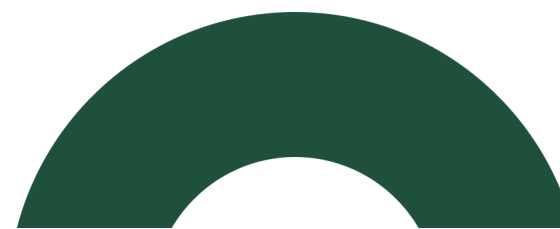




D3.1 Living Labs Learning Community Mapping

Table 3.5.1. Local and regional actors with a stake in the prevention and management of invasive alien species within the Romania Living Lab area, categorised by type (Research and education; Public sector; Civil Society; Business). An asterisk (*) denotes organisations currently represented in the Living Lab core Learning Community.

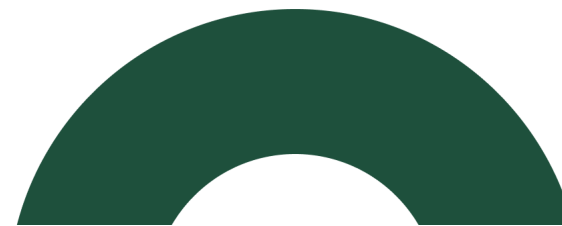
Stakeholder group	Research & Education	Public Sector	Civil Society	Business
Local (directly dealing with IAS, in the Living Lab area, representatives are in the core Living Lab group)	Ovidius University of Constanta*	Environmental Protection Agency of Constanta*	Chelonia Romania*	Hornbach Constanta*
	The Natural Sciences Museum Complex Constanta*	The National Railway Company (Constanta Branch)*	Professional Association of Romanian Urbanists*	
	Danube Delta Biosphere Reserve Authority*	National Company Maritime Ports Administration S.A Constanta*	Association for the Conservation of Biological Diversity	
	Grigore Antipa National Museum of Natural History, Bucharest	Sanitary Veterinary and Food Safety Directorate*		
		National Agency for Protected Natural Areas Tulcea County*		
Other potential local stakeholders		The National Environmental Guard - Constanta County		Zoostud Consulting
		City Hall of Constanta		
		Forestry Department		
		Regional Directorate of Roads and Bridges Constanta		





D3.1 Living Labs Learning Community Mapping

		Coast Guard		
		Public Health Department		
Regional/National (not directly involved in the Living Lab core group or active in the Living Lab area but important to keep informed)		National Forest Administration	The Romanian Botanical Gardens Association	
		Administration of the Navigable Canals		
		Constanta County Council		
		Macin Mountains National Park Administration		





3.5.2 Key sampling sites and target species

A stakeholder consultation session was held to discuss potential IAS management options and best practices, with a focus on identifying key species and locations in Dobrogea. The session highlighted challenges, knowledge gaps, and potential management strategies, providing a foundation for participatory governance and helping ensure that the Romania Living Lab remains inclusive, knowledge-driven, and action-oriented. It is worth mentioning the session brought up discussions on aquatic IAS and habitats, highlighting the complexity of biological invasions as a process and the complementarity of OneSTOP and GuardIAS projects.

The Living Lab attendees expressed interest in several areas, including:

- Deploying and co-locating innovative technologies for monitoring to enable data comparison, method validation, and visitor engagement at educational or protected sites, including the Macin Mountains National Park and local nature reserves.
- Deploying monitoring technologies in public parks, green spaces, and coastal areas to raise awareness of IAS while collecting data.

CamAlien

- Mapping invasive plants along main roads, county roads, coastal access routes, urban fringes, and transport corridors using CamAlien devices; as well as mounting them on small boats to survey canals and lagoon edges, potentially alongside airDNA sampling.
- Surveying the invasive tree-of-heaven, *Ailanthus altissima*, or the common ragweed, *Ambrosia artemisiifolia*, along railway tracks using CamAlien to map the distribution and identify suitable areas for management.

AirDNA sampler and AMI Trap

- Placing airDNA samplers at transport hubs, including the Port of Constanta, to detect alien species potentially arriving via imports or distributed goods.
- Co-locating airDNA samplers and AMITrap devices at sites with well-documented species records to compare current and historical data.

Stakeholders also identified several priority areas, essential for the effective establishment and long-term functioning of the Romania Living Lab:

- Ensuring detailed and transparent data on IAS and their impacts.
- Prioritising management in potential “bright spot” areas.
- Promoting citizen science to enhance monitoring and reporting.
- Increasing local community involvement and awareness of the impacts of IAS.





3.6 Uusimaa Living Lab, Finland

3.6.1 Social-ecological setting

The Uusimaa Living Lab is located in southern Finland, on the coast of the Baltic Sea, in Northern Europe. According to the Köppen climate classification, the region falls into category Dfb, meaning a continental climate with cold winters, relatively warm summers, and precipitation distributed fairly evenly throughout the year.

Uusimaa covers an area of about 9,100 km² (approx. 3% of Finland's land area) along the southern coastline of Finland. It is one of Finland's 19 regions, with the Helsinki metropolitan area – Helsinki, Espoo and Vantaa – at its core. There are a total of 26 municipalities in Uusimaa. This is the largest urban area in Finland and its administrative and economic centre. The total population of Uusimaa is approximately 1.8 million, making it the most densely populated region in Finland (186 inhabitants/km²), home to almost 30% of the national population.

The natural environment is highly varied. In the south and along the coast, the landscape is shaped by the archipelago, fragmented shorelines, and dense urban areas, whereas further north, extensive forests, agricultural land and lakes dominate. Around 60% of Uusimaa is forested, and farmland is concentrated especially in the western and northern parts of the region. In addition, the area hosts a wide range of parks, protected areas, and Natura 2000 sites. Notable national parks include Nuoksio and Sipoonkorpi.

The Baltic Sea coastline forms a significant ecological and economic zone. The region is also a key hub for transportation and trade: Helsinki-Vantaa International Airport, the Port of Helsinki, and a dense railway and road network connect Uusimaa to the rest of Finland and to international routes. These features also make the region a potential high-risk area for the introduction and spread of IAS.



Figure 3.6.1: A map showing the area covered by the Uusimaa Living Lab.





3.6.2 Stakeholder mapping & formation of core Learning Community

The Natural Resources Institute Finland (LUKE), the local consortium partner for the OneSTOP project in Uusimaa, identified and mapped the local and regional actors already actively engaged with the prevention and management of IAS within the Living Lab area (Table 3.6.1). Groups and organisations known to the research team were classified as either local or regional actors, and further categorised into the groups of Research and education, Public sector, Civil society, or Business. As in other Living Labs, this process was complemented by a snowballing technique: stakeholders initially identified were approached and invited to suggest additional relevant organisations and networks active in the field. This ensured a broader and more representative mapping of the IAS-related actors within the Uusimaa Living Lab.

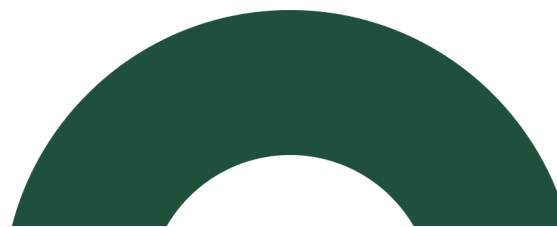




D3.1 Living Labs Learning Community Mapping

Table 3.6.1. Local and regional actors with a stake in the prevention and management of invasive alien species within the Uusimaa Living Lab area, categorised by type (Research and education; Public sector; Civil Society; Business). An asterisk (*) denotes organisations currently represented in the Living Lab core Learning Community.

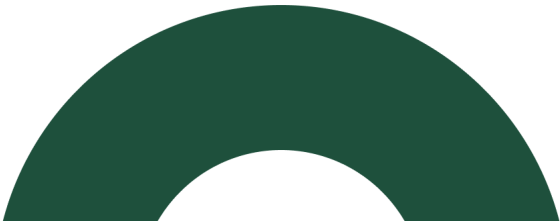
Stakeholder group:	Research & Education	Public Sector	Civil Society	Business
Local (directly dealing with IAS, in the Living Lab area, representatives are in the core Living Lab group)	Finnish Museum of Natural History*	City of Helsinki*	Finnish Association for Nature Conservation*	Vieraslaajapu Tmi*
		City of Espoo*	WWF Finland*	Rosling Manor Gardens*
		Centre for Economic Development, Transport and the Environment in Uusimaa*	Baltic Sea Action Group	Nurseries e.g. Puutarha Tahvoset Ltd
		Finnish Food Safety Authority*		
Other potential local stakeholders	University of Helsinki	Finnish Transport Infrastructure Agency		
	Finnish Biodiversity Information Facility (FinBIF)	Metsähallitus (National parks: Nuuksio and Sipoonkorpi)		
		Finnish Environment Institute (Syke)		
Regional/National (not directly involved in the Living Lab core group or active in the Living Lab area but important to keep informed)		The Finnish Advisory Board for Invasive Alien Species	The Association of Finnish Cities and Municipalities (Kuntaliitto)	
		Ministry of Agriculture and Forestry	BirdLife	



D3.1 Living Labs Learning Community Mapping



			The Central Union of Agricultural Producers and Forest Owners (MTK)	
			Gardening Association (Puutarhaliitto)	
			The Finnish Association of Landscape Industries (Viherympäristöliitto)	





D3.1 Living Labs Learning Community Mapping

Following the stakeholder mapping activity, project partners also took part in the Finnish Advisory Board for IAS meeting held in Helsinki in May 2025. At this meeting, the project was presented to a wider community of IAS stakeholders, and interest in joining the Uusimaa Living Lab's core group was explored. Subsequently, targeted invitations were sent to stakeholders identified during the mapping as well as those identified at the Advisory Board meeting. As a result, a core Learning Community was established to guide Living Lab activities going forward. The organisations represented in this core group are highlighted in Table 3.6.1.

This composition ensures a broad representation across public sector authorities, civil society organisations, research and education, as well as business actors. Members of the group play key roles in IAS work in Finland, including policy implementation, environmental management, biodiversity monitoring, research, public engagement, and advisory services. Their involvement provides the Uusimaa Living Lab with strong expertise and diverse perspectives, ranging from municipal responsibilities at the local level to national-level coordination and advocacy.



Figure 3.6.2: Group photo of the first Uusimaa Living Lab meeting

3.6.3 Key sampling sites and target species

Key sampling species to be tested with the technologies as well as potential sites were identified through a round table discussion at the Living Lab core community meeting. Additional suggestions were also collected onto sticky notes on a flipchart for further





D3.1 Living Labs Learning Community Mapping

processing. Some of the main points about the technologies raised during the discussions included:

AMITrap

- Target organisms could include quarantine pests, invasive alien insect species listed on the national IAS webpage (vieraslaajit.fi), and species of particular concern such as moths, the Japanese beetle (*Popillia japonica*) and emerald ash borer (*Agrilus planipennis*).
- Potential deployment sites: ports, airports, botanical gardens, protected areas, soil and waste handling facilities. Ports in particular were seen as critical sites for early detection upon arrival.
- Suggestions were made about the possibility of enhancing the trap with pheromones to increase insect captures.

AirDNA sampler

- Considered particularly useful in valuable nature sites
- Potential sites: valuable conservation areas, rivers and riparian zones, agricultural landscapes, and introduction pathways such as ports, airports, and plant nurseries.
- Deployment by riverside or potentially from boats was discussed, inspired by the UK canal survey.
- Applications could also include the detection of invasive alien weeds and microbial quarantine pests. *Erwinia amylovora* was highlighted as an important species requiring enhanced monitoring, while others mentioned the pine wood nematode (*Bursaphelenchus xylophilus*) and *Ophiostoma novo-ulmi*, which are of particular concern in Finland due to the country's extensive forest cover.
- Participants expressed preference for metabarcoding approaches, to allow broad detection of IAS across taxonomic groups.

CamALIEN

- Suggested target species for CamALIEN included *Solidago canadensis* (Canadian goldenrod), *Lupinus polyphyllus* (garden lupin), *Sorbaria sorbifolia* (false spiraea), *Rosa rugosa* (Japanese rose), *Heracleum mantegazzianum* (giant hogweed), *Impatiens glandulifera* (Himalayan balsam), *Echinochloa crus-galli* (barnyard grass), and *Avena fatua* (wild oat).
- Priority areas for surveys include southern coastal zones such as Hanko, main highways, and newly constructed or recently managed road verges where invasive alien plants often establish.
- Timing, coverage, prioritisation, and logistics of surveys were discussed. Repeated surveys over several years could be used to monitor northward spread of IAS.
- Potential end-users mentioned included the Finnish Transport Infrastructure Agency (Väylävirasto), as they already cover large areas by vehicle and could integrate monitoring into routine routes.
- The system could also be applied to detect tree health issues, for example mapping *Fraxinus excelsior* (common ash) and identifying potential infestations by invasive pests such as the emerald ash borer. Mapping ash stands is particularly relevant, as their distribution is also not comprehensively documented in Finland.
- There was also discussion of expanding CamALIEN to monitor smaller animals with mass occurrences, such as the slug *Arion vulgaris*, which recently became unusually





D3.1 Living Labs Learning Community Mapping

common in parts of Uusimaa, as well as the invasive alien flatworm *Obama nungara*, which requires new monitoring approaches.

- In addition, CamALIEN could be tested in agricultural areas, where it could be very suitable for *E. crus-galli* and *A. fatua* monitoring.
- The Finnish Association for Nature Conservation expressed specific interest in piloting CamALIEN within the Uusimaa Living Lab.

Sentinel gardens

- Linked ideas to WWF Finland's and OP Bank's "rewilding" campaign, with potential to engage the public in monitoring IAS in managed garden or demonstration settings.





4. Acknowledgements

We thank all the stakeholders who are participating in our Living Labs for their time, insight and expertise, and everyone who has provided logistical and operational support in organising the in-person meetings and the testing of the technologies. We also thank our consortium partners for presenting at our Living Lab meetings and coordinating and supporting the delivery and/or set-up of the innovations for testing within the Living Labs.





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6. Appendices

Contents:

6.1 Minutes of the first Portugal Living Lab meeting, 2025

6.2 Minutes of the first Coventry & Warwickshire Living Lab meeting, 2025

6.3 Minutes of the first Belgium Living Lab meeting, 2025

6.4 Minutes of the first Constanta Living Lab meeting, 2025

6.5 Minutes of the first Uusimaa Living Lab meeting, 2025

6.6 Baseline Survey Questionnaire





6.1 Minutes of the first Portugal Living Lab meeting, 2025

Workshop Title: OneSTOP Living Lab: Co-Creation and Knowledge Sharing Workshop on Biological Invasions

Date: [08/05/2025]

Time: [10:00 – 13:00]

Location: In person at BIOPOLIS

Facilitator(s): BIOPOLIS-CIBIO team:

Joana Vicente

Cândida Gomes Vale

Eva Malta Pinto

João Gonçalves

Sofia Cardoso

1. Objectives

- 1) Introduce the OneSTOP project and its Living Lab in Portugal;
- 2) Identify the Living Lab core community;
- 3) Promote dialogue and collaboration among participants;
- 4) Facilitate the sharing of knowledge and experiences on invasive alien species.

2. Agenda

9:45 | Registration

10:15 | Welcome and Opening Remarks - hosted by Joana Vicente

10:20 | Presentation of the OneSTOP Project

General overview of the project (Joana Vincent)

Living Labs presentation (Eva Malta Pinto)

Technologies presentation (Cândida G. Vale)

10:50 | Brief icebreaker exercise – As an icebreaker, each participant introduced themselves and shared which vegetable they would be.

10:55 | OneSTOP Baseline survey

11:15 | Group Photo and Coffee break

11:45 | Interactive Exercise using Mentimeter and debate

Questions:

- 1) What type of organization do you represent?
Academia, Government, Private Sector, Civil Society
- 2) What 3 words come to mind when you think of “biological invasions”?
- 3) In your opinion, what are the 5 most concerning invasive alien species?
- 4) How would you feel about participating in eradication actions for the following groups of species? Mammals, birds, amphibians/reptiles, insects, other invertebrates, plants (scale from 1 to 5)
- 5) What 3 wishes or expectations do you have for this Living Lab?

12:30 | Participatory Mapping Exercise

13:00 | Closing and Lunch

3. Key Topics

- All participants expressed strong interest in the OneSTOP project, particularly in the opportunity to apply new technologies within their areas of intervention.
- All participants completed the OneSTOP baseline survey.





D3.1 Living Labs Learning Community Mapping

- From the word cloud generated during the interactive exercise (Question 2), the most prominent words were "**Biodiversity**" and "**Impact**", followed closely by "**Cost**".
- Question 3 sparked a discussion about certain species and whether they should be classified as terrestrial or aquatic invasive species.
- While most participants were comfortable with the idea of removing invasive plants, a surprisingly high number also expressed no objection to removing mammals or birds.
- In response to the final question of the Interactive Exercise, participants shared their expectations regarding their involvement in the OneSTOP project.
- A last-minute question was added to identify who would be interested in joining the core community of the Living Lab. - Do you want to be part of the Living Lab core community?
- In the Participatory Mapping exercise, each participant received stickers of different colors based on their institutional affiliation. They were then encouraged to place the stickers on the maps in response to four key questions:

Where are invasive alien species located? – *Invasive Species Distribution*

Where do invasive species have an impact? – *Impact of Invasive Species*

Where are the priority areas for managing invasive species? – *Priority Areas for Management*

Where are the key detection points for applying OneSTOP's innovative technologies? – *Key Detection Points*

• The participatory mapping exercise provided an opportunity for participants to share their knowledge and engage with one another.

4. Next Step

- Select the Living Lab Core Community and contact them





6.2 Minutes of the first Coventry & Warwickshire Living Lab meeting, 2025

Minutes of the Coventry & Warwickshire Living Lab Inaugural Meeting, Wednesday 21st May 2025

Location: Coventry University (CU), Centre for Agroecology, Water and Resilience (CAWR), Ryton Gardens

Present: Katharina Dehnen-Schmutz (CU); (Warwickshire Biological Records Centre); (BSBI); (Severn Trent Water); Helen Bayliss (CU); Alex Franklin (CU); (Coventry City Council); Lori Handley (UKCEH); Tom Myers (Platform Kinetics); (Warwickshire Wildlife Trust); Sian Green (CU); (Environment Agency); (Coventry City Council); (Canal & River Trust); (Canal & River Trust).

09:00 Welcome, registration and coffee

Participants signed in and completed the project consent form and anonymous gender and ethnicity monitoring form.

09:30 Participants' introductions and introduction to the project

Participants introduced themselves around the table and identified the species they would like to least see arrive in the Living Lab area (or alternatively their 'favourite' invasive).

Katharina Dehnen-Schmutz welcomed participants and provided an overview of the project, including what a living lab is, and the project aims. Participants completed the baseline survey to record their self-assessed levels of knowledge and understanding.

10:00 Mapping of participants' views, structures, practices and key stakeholders

A discussion followed, led by Alex Franklin, where participants identified both strengths and weaknesses relating to three broad areas: 1. Knowledge, Perception, Viewpoints; 2. Actions, Practice, Behaviour and 3. Policy & Regulation / Systems & Structures / Key Stakeholders.

10:30 Using air eDNA to detect and monitor invasive species

Lori Lawson Handley, UKCEH, gave an overview of airborne eDNA and the options for either a species-specific targeted approach or a broader meta-barcoding approach using examples of how these have been used previously. Tom Myers, Platform Kinetics, then introduced the BiotaTrace airborne DNA sampler. Lori then asked participants to suggest species, pathways and sites, and identify key benefits and concerns of using airborne eDNA.

Coffee break

11:15 Automatic camera detection systems (online presentation)

Toke Thomas Høye, Aarhus University, provided an overview of the two camera systems being trialled in the Living Labs, CamAlien, a vehicle-mounted high-resolution camera for mapping and identifying species alongside road or other transport routes, and the AMI (Automated Monitoring of Insects) trap.

11:30 Breakout session: Identifying suitable sites and species

Participants first discussed co-location and the static vs. mobile technologies and the types of species they could be used to identify before discussing potential species and





D3.1 Living Labs Learning Community Mapping

sites within the Living Lab area. Several promising ideas were proposed. There was also some discussion about cross-over with aquatic species as many participants have an overlapping focus.

12:00 Decision on priority sites and species for technologies & public survey

Several sites were suggested, including some where existing species records are available and where the public can be engaged, and on sites where access may not be easy for traditional surveys (e.g. by motorways and ring roads, or canals with limited towpath access). Details on suggested sites and species were recorded during the discussion and on sticky notes by participants. Participants also suggested invasive species the public should be aware of for inclusion in the public survey on sticky notes.

12:30 Participants' expectations and next steps

Timelines for access to equipment and data collected were discussed, as were the next steps of the project relevant to the Living Lab community. Alex Franklin gave a brief overview of the DAISY project. Participants gave a brief summary of their expectations and thoughts based on the day's events. All participants were positive about the project moving forward and most had ideas of how the technologies could be usefully deployed.

13:15 Lunch and finish





6.3 Minutes of the first Belgium Living Lab meeting, 2025

Date: 24 June 2025

Location: Meise Botanic Garden - Vlaamse Hoeve

Partners: INBO & MeiseBG

Participants: *Link to the sign-in sheet*

Notetakers: Louise Hendrickx, Soria Delva, Laura Abraham

1. Introduction to the Project & Living Labs

The project was introduced by Louise, Laura, and Soria.
Simon Reynaert (Meise Botanic Garden) presented iEcology.

Discussion points:

- Should there be an *automatic pop-up* (via app or mobile-friendly website) when reporting an observation?
- Focus on plant species: only Union list species or a broader range?
- “How do you access my garden lab?” → Suggestion: automatic pop-up when a photo of an invasive species is taken.
- Will it be developed as an app? Identification could rely on existing apps like *ObsIdentify*.
- The website should be mobile-friendly.
- Most gardens consist of around **45% non-native species**, though not all are invasive.

2. Participant Introductions

Results were collected through Mentimeter.

3. Presentation: CamAlien (Bram D’hondt)

Questions & Discussion:

- **What will be done with all the data?** → Translation into management and policy applications.
- **How to mobilize people, policymakers, and municipalities to take action?**
→ Especially useful for *rapid response*, prioritization, and decision-making.
- **What is the time investment afterwards?**
→ Running image recognition is time-consuming (e.g., PlantNet took months to process all images). Optimization is ongoing. Integration of image recognition into cameras is being explored.
- **Can other elements be monitored beyond exotic species?**
- **Mounting cameras on drones** could help move away from linear scanning structures.
→ Lateral vs. orthogonal perspectives require different training data.
→ Drones could also be tested on smaller scales.





D3.1 Living Labs Learning Community Mapping

4. Presentation: eDNA (Lori – Online)

Questions & Discussion:

- **How complete is your DNA database for target detections?**
 - Large collective effort in the UK to curate reference databases. Plant databases are comprehensive; invertebrate coverage is fairly good.
 - Suggestion: compile a list of target species and assess database coverage.
- **Do you understand how far pollen can travel?**
 - Many factors affect this. The detection signal decreases with distance from the source.
- **Current state of the technology?**
 - Mainly presence/absence data; abundance estimation is context-dependent.
 - Rough correlation exists between biomass and signal strength.
 - *Metabarcoding* methods are evolving to improve this.

5. Mini Presentation – Bram:

- Use of **Muntjac eDNA** to detect *Chinese muntjac* in **Park Vordenstein**.
- A **vacuum air sampler** is available via *OneSTOP*.

6. Session: Identify Species & Sites

Explanation of the setup and interactive exercise:

Participants used four color-coded post-its for the four technologies.

7. Consensus on Species & Sites

CamAlien Locations

- Provincial waterways around Brussels that are sufficiently wide.
- *Impatiens glandulifera* (Himalayan balsam) observed along ditches and in Overijse.
- Provincial waterways near roads (not always the case).
- Use of kajak to view gardens along waterways to detect exotics (e.g., bamboo).
- Potential to walk or cycle with CamAlien, though distance loss is a limitation.
- Consider use on **boats or cars** in connection with OneSTOP CamAlien.

Forests in Limburg:

- Focus on edges and accessible forest roads.
- Firebreaks in deciduous forests stretch for kilometers, suitable for 4x4 inspection.
- Main invasive species: *Prunus serotina* (American bird cherry).
- Need for fast detection and inventory to support management decisions (e.g., which species to plant as competitors such as *Populus tremula*).
- Evaluate which invasive species occur near specific native tree types (*Pinus sylvestris*, *Quercus*, *Betula*).

Planned tests:

- CamAlien along navigable and non-navigable waterways and in forests.





D3.1 Living Labs Learning Community Mapping

- Pilot test in Limburg forests in autumn 2025, when *Prunus serotina* turns bright yellow.

Waterway monitoring (Belgium):

- Possible use of Zodiac, canoe, or boat.
- Contact: Ingrid Beuls (Flemish Brabant) – season planning considering drought.
- Common target species: *Fallopia japonica* (Japanese knotweed), *Heracleum mantegazzianum* (giant hogweed).
- VMM water plant surveys currently limited – integration with exotics data could be valuable.
Interest from French partners.
- Contacts: Karel (Rato) and Pieter Boets (East Flanders).

Workshop:

- One-day practical test with all partners; results will be shared afterwards.
- Minimum of five Living Lab days required for OneSTOP, but more workshops are possible.
- *Damse Vaart* could be used for a larger-scale joint test (larger boat).

AMITrap Locations

- Sites that can be closed off:
 - GOG Elsemheide
 - GOG Bierbeek
- Provincial domains in Flemish Brabant
- Green roof of PCM in Ghent
- Provincial domain of Diest
- Bokrijk Arboretum – greenhouse available

Data sharing:

- Aim to include all partners and share data afterwards.
- Preliminary INBO data can already be shared.

To do: Include in stakeholder email: “Who would like to use the AMITrap and where?”

Discussion points:

- Could the Asian tiger mosquito be captured with the AMITrap? Possibly, as it is attracted to light and easily identifiable.
- Box tree moth and biocide use – discussion on proportionality and monitoring larval density.
- Ports of Antwerp and Ghent considered interesting as introduction routes.

eDNA Locations

- Willebroek
- Bokrijk





D3.1 Living Labs Learning Community Mapping

These will be the last sites tested through **Lori (UK)**, with stakeholder feedback in **2026**.

Target species for eDNA:

- Korean ground squirrel
- Raccoon
- Muntjac
- Coypu (nutria)

8. Participants' Expectations & Next Steps

Platform for communication:

- To share updates, results, and announcements of new events.
- Options discussed: WhatsApp, mailing list, LinkedIn group, Teams.
 - WhatsApp seen as too informal, especially without work phones.
 - Not everyone uses LinkedIn.
 - Teams preferred for sharing results – check with INBO if feasible.

Expectations for the Living Lab:

- Reference to FAVV (Belgian Food Safety Agency) list of pathogens that must be kept out (e.g., *Xylella fastidiosa* – olive pest).

9. Group Picture

A group picture was taken at the end of the day.





6.4 Minutes of the first Constanta Living Lab meeting, 2025

20th June 2025

Living Lab RO Minutes

Workshop title: **Management of Invasive Alien Species: A Participatory Approach**

Location: **Faculty of Natural and Agricultural Sciences, Ovidius University of Constanta**

Facilitators: Cristina Preda, Daniyar Memedemin, Laurentiu Rozylowicz, Carla Gavrilesu

Agenda:

9:30 – 10:00 Welcome, registration, and coffee

10:00 – 11:00 Presentation of the OneSTOP Project

OneSTOP: Proactive management of invasive species at the European level -
Cristina Preda

Best practices in the management of invasive alien species - Daniyar Memedemin

11:00 – 12:30 Engaging the local community in invasive alien species management

- Cristina Preda, Daniyar Memedemin

12:30 – 14:00 Open discussions, group photo, and working lunch

The workshop to launch Romania's Living Lab under the OneSTOP project was held at the Faculty of Natural and Agricultural Sciences, Ovidius University of Constanța. The event gathered university staff, researchers, representatives from local authorities, NGOs, and private sector stakeholders, as well as community members interested in biodiversity conservation ([participant list](#)). With a focus on the Dobrogea Region in south-east Romania, the meeting aimed to encourage a participatory approach to IAS management and to facilitate knowledge-sharing among participants. Upon arrival, participants received a portfolio containing the participant information sheet, the participation agreement, and the baseline survey.

Carla Gavrilesu and Cristina Preda (UOC) welcomed the participants at the start of the workshop. Participants then completed the baseline survey to record their knowledge and understanding. Following this, Cristina provided an overview of the OneSTOP project and introduced the Living Lab model as a framework for participatory, real-world innovation. Participants were also introduced to innovative technologies for the early detection and monitoring of IAS. Daniyar Memedemin subsequently led a discussion on IAS management options and best practices, followed by a stakeholder consultation session focused on identifying IAS and key locations of interest in Dobrogea.

This gap in public knowledge potentially limits the early detection and reporting of invasive species, which are crucial for timely control interventions. A significant presence of *Ambrosia artemisiifolia* has been reported along railway tracks. However, the exact locations of problematic areas were not specified, and maintenance teams continue to carry out costly vegetation removal operations to help control the spread of this species. *Ophraella communa* (native to North America, currently present in western and central Romania, with numerous records in Bucharest) is a potential biological control agent for common ragweed (*Ambrosia artemisiifolia*). Law 62/2018 regulates the control of ragweed in Romania, requiring measures to be applied throughout the entire vegetation period. However, enforcement remains weak, largely due to the limited involvement of local administrations and low public





D3.1 Living Labs Learning Community Mapping

participation. At the county level, most afforestation projects submitted and approved in recent years have predominantly used *Robinia pseudoacacia* due to its high adaptability.

Within the biosphere reserve, forest management activities, including shelterbelt establishment, dike reinforcement, and ecological restoration, have primarily used black locust as the main species.

In the latest version of their inventory list, the following species are included:
94 plants, 4 mollusks, 9 fish, 7 birds, 4 mammals, and 30 insects.

Pronounced discrepancies across existing information sources have generated confusion among stakeholders and decision-makers. This lack of clarity undermines coordination and impedes the effective allocation of resources for the management of invasive alien species (IAS).

To address these challenges, the following solutions are recommended:

- **Implement sanction-based measures** to ensure compliance with invasive species control regulations.
- **Develop simple and practical control methodologies**, structured by species and corresponding management methods (e.g., species – control method format), to facilitate standardised application across regions.
- **Use incentive-based mechanisms**, such as rewards, to encourage the removal of IAS by landowners and local communities.
- **Promote citizen science applications**, such as iNaturalist, to increase public engagement and enhance community-based monitoring and reporting.
- **Consider adjusting catch limits for invasive species** where ecologically justified, as recommended for ANPA (National Agency for Fisheries and Aquaculture).
- **Increase involvement of local communities**, recognising the current low participation in citizen science and the general lack of awareness regarding the ecological and economic impacts of IAS.
- **Secure and allocate targeted funding** to support research, control, and eradication efforts.
- **Ensure detailed and transparent data**, including precise numbers of invasive species, their geographic distribution, and comprehensive impact assessments.
- **Focus efforts on identified “brightspot” areas**, prioritising invasive species that can be realistically managed or eradicated (e.g., *Asclepias syriaca*, *Nyctereutes procyonoides* — the latter potentially subject to control through male sterilisation programmes).





D3.1 Living Labs Learning Community Mapping

Upcoming Tasks

Select the core group members





D3.1 Living Labs Learning Community Mapping

6.5 Minutes of the first Uusimaa Living Lab meeting, 2025

Minutes of the Uusimaa Living Lab Inaugural Meeting, 14th September 2025

Location: Scandic Grand Central, Helsinki, Uusimaa

Present: Minna Oja (City of Espoo), Armi Koskela (City of Helsinki), Teemu Niinimäki (WWF), Taina Suonio (**Rosling manor gardens**), Markus Seppälä (**Vieraslajiapu tmi**), Emilia Piipponen (**The Finnish Association for Nature Conservation**), Paula Salomäki (**Uusimaa Centre for Economic Development, Transport and the Environment**), Aino-Maija Alanko (**Finnish Food Authority**), Anna Poimala (Luke), Eeva Vainio (Luke), Heidi Blom (Luke), Miia Jauni (Luke), Lori Lawson Handley (UKCEH), Toke Thomas Høye, (Aarhus University)

09:00 Welcome and coffee

09:20 Introducing the participants and the project

Participants introduced themselves and provided suggestions on the species they would like to concentrate on related to the Living Lab activities, and species that have been most problematic recently in Uusimaa (for example White meadowsweet (*Spiraea alba*)) and Finland overall, also species that have not arrived yet to Finland but should be monitored closely (e.g., emerald ash borer, Asian tiger mosquito). They also mentioned ongoing projects with similar topics that could share synergies with OneStop, for example the Inter-Aurora project Inspire. Anna Poimala welcomed participants and provided an overview of the project aims and approaches to be tested. The AMI-trap apparatus was showcased to the participants.

9:50 Introducing the baseline-survey: mapping participants' views, structures, practices and key stakeholders

Participants were introduced to the baseline survey of OneStop. The survey forms were collected for further processing and compiling the results.

10:30 Online presentation on aerial eDNA monitoring by Lori Lawson Handley (UKCEH)

Lori Lawson presented plans for airborne eDNA monitoring and on selecting possible sites. It was discussed that when picking the surveillance sites it is of utmost importance to consider sensitivity issues and potential disturbance (noise) to wildlife. Pilot monitoring could be organized at University campuses or similar. Waterways are potential for surveillance via boat (possibly combined with CAM-Alien > targeting e.g. giant hogweed, Himalayan balsam).

11:15 Online presentation on Ami-trap and CamAlien by Toke Thomas Høye, (Aarhus University)





D3.1 Living Labs Learning Community Mapping

Toke Høye provided an overview of the camera systems to be tested in the Living Labs: CamAlien, a high-resolution camera mounted to cars for mapping and identifying species alongside road or other transport routes, and the AMI trap for monitoring insects. The possibility of using CamAlien on trains or small airplanes was discussed.

11:30 Round-table discussion: Identifying suitable sites and species

Participants proposed ideas on how to organize testing and surveillance campaigns for IAS during the project. Possible priority sites were discussed, and additional suggestions were collected onto sticky notes a flapboard for further processing. The suggested sites included hotspot sites such as motorways, ports and harbors, airports, botanical gardens, garden centers (incl. importers of woody materials), parking lots, landfill areas. On the other hand, it was raised up that nature protection areas and occurrences of threatened species such as Ash stands (*Fraxinus excelsior*) in the Uusimaa region should be monitored for early detection of IAS.

Participants expressed interests for volunteering for implementing the surveys: for example SLL could use CAM alien cameras for automobiles. Also, WWF has vast experience and possibilities to mobilize volunteer citizens for BioBlitz -events and similar events for competence building. Also WWF's rewilding project could have synergies and share volunteer participants with OneStop activities. In Finland, the hyperallergenic *Ambrosia artemisiifolia* has been the target of citizen science surveillance earlier led by University of Turku. Luomus (unable to participate in the first meeting) maintains botanical gardens that are envisaged as possible sites for Bioblitz events.

Regarding **Ami-trap insect monitoring** it was discussed if the trap could be combined with additional attractives such as pheromones. Key targets for surveillance could be invasive moth species, Japanese beetle (*Popillia japonica*), emerald ash borer (*Agrilus planipennis*).

CAM Alien was regarded most suitable for monitoring plants and animal carcasses (roadkills). It was also discussed whether it could be used for smaller animals with mass occurrences, such as the slug *Arion vulgaris*, which has become highly common in parts of Uusimaa due to a rainy beginning of summer 2025. Also the worm *Obama nungara* is in the need of new monitoring approaches. Knowledge gaps: how well are camera systems optimized for Boreal species? How many species can be detected simultaneously? - Testing and validation is required. Possible plant target species mentioned for monitoring were *Solidago canadensis*, *Lupinus polyphyllus*, *Sorbaria sorbifolia*, *Rosa rugosa*, *Heracleum mantegazzianum*, *Impatiens glandulifera*, *Echinochloa crus-galli*, *Avena fatua*.

Regarding Air DNA monitoring it was discussed that two different types of sites would be the priority: 1) valuable nature sites, such as riverbanks, agricultural environments; 2) hotspot entry sites for IAS as listed above. AirDNA monitoring could include pollen from invasive plants, invasive alien microbe species, insect fragments. Metabarcoding would enable simultaneous detection of many species. *Erwinia amylovora* was mentioned as one important pest needing enhanced monitoring, others include the pine wood nematode *Bursaphelenchus*





D3.1 Living Labs Learning Community Mapping

xylophilus and *Ophiostoma novo-ulmi*, particularly in Finland where forests cover main part of the country.

12:00-13:00 Group photo and lunch

Discussion on topical IAS challenges continued over lunch and it was concluded that the participants were enthusiastic about the new monitoring approaches that will be tested during the project, and that the project fosters opportunities for networking and expressing common opinions.





6.6 Baseline Survey Questionnaire

Living Lab baseline survey

Thank you for agreeing to participate in the Coventry & Warwickshire OneSTOP Living Lab. The OneSTOP project (<https://onestop-project.eu/>) is designed to test novel technologies and early alert systems for invasive species detection and monitoring in real landscapes and to establish two-way channels for sharing updates, findings and knowledge with stakeholders involved in invasive species management.

The aim of this survey is to create a baseline of current expertise and approaches used for invasive non-native species detection and monitoring. We will use the results to document any impacts of the project.

1. About you

Organisation:
Name (voluntary):
To what extent are you involved in decision-making related to invasive species detection and management in your organisation? ☐ Not at all ☐ Slightly ☐ Moderately ☐ Very ☐ Extremely

2. Current knowledge and expertise

How would you rate your expertise in invasive non-native species <u>detection and identification</u>? ☐ No expertise ☐ Beginner ☐ Intermediate ☐ Advanced ☐ Expert
How would you rate your expertise in invasive non-native species <u>management</u>? ☐ No expertise ☐ Beginner ☐ Intermediate ☐ Advanced ☐ Expert
At what scale do you work / have responsibilities for invasive non-native species? ☐ Local (Coventry+Warwickshire) ☐ Regional (Midlands) ☐ National (England or GB)
What is the focus of your invasive non-native species work (tick all that apply)? ☐ Plants ☐ Invertebrates ☐ Vertebrates ☐ Other, please specify:




What methods have you already used to detect and monitor invasive non-native species?

Field surveys	☐ Never	☐ Tried it	☐ Occasionally	☐ Frequently
Remote sensing	☐ Never	☐ Tried it	☐ Occasionally	☐ Frequently
eDNA	☐ Never	☐ Tried it	☐ Occasionally	☐ Frequently
iEcology	☐ Never	☐ Tried it	☐ Occasionally	☐ Frequently
Sentinel gardens	☐ Never	☐ Tried it	☐ Occasionally	☐ Frequently
Citizen science	☐ Never	☐ Tried it	☐ Occasionally	☐ Frequently
Computer vision	☐ Never	☐ Tried it	☐ Occasionally	☐ Frequently
Early Alert Systems	☐ Never	☐ Tried it	☐ Occasionally	☐ Frequently

None (not conducting detection and monitoring) ☐

Other, please specify:

How familiar are you with the following emerging detection and monitoring technologies?

eDNA	☐ Not at all	☐ Slightly	☐ Moderately	☐ Familiar	☐ Very familiar
iEcology	☐ Not at all	☐ Slightly	☐ Moderately	☐ Familiar	☐ Very familiar
Sentinel gardens	☐ Not at all	☐ Slightly	☐ Moderately	☐ Familiar	☐ Very familiar
Citizen science	☐ Not at all	☐ Slightly	☐ Moderately	☐ Familiar	☐ Very familiar
Computer vision	☐ Not at all	☐ Slightly	☐ Moderately	☐ Familiar	☐ Very familiar
Early Alert Systems	☐ Not at all	☐ Slightly	☐ Moderately	☐ Familiar	☐ Very familiar

3. Practical challenges & effectiveness of current approaches

What are the biggest challenges you face in detection and monitoring in your area of responsibility? Please explain:

How effective do you believe current detection and monitoring methods are in the region of the Living Lab (Coventry & Warwickshire)?

Please rate on a scale from 1 (not effective) to 5 (highly effective):

How effective do you believe current management methods are in the region of the Living Lab (Coventry & Warwickshire)?

Please rate on a scale from 1 (not effective) to 5 (highly effective):

4. Adoption & acceptability of new technologies





Would you be open to incorporating new detection technologies into your current work?				
eDNA	☐ Not at all	☐ Slightly	☐ Moderately	☐ Very ☐ Extremely
iEcology	☐ Not at all	☐ Slightly	☐ Moderately	☐ Very ☐ Extremely
Sentinel gardens	☐ Not at all	☐ Slightly	☐ Moderately	☐ Very ☐ Extremely
Citizen science	☐ Not at all	☐ Slightly	☐ Moderately	☐ Very ☐ Extremely
Computer vision	☐ Not at all	☐ Slightly	☐ Moderately	☐ Very ☐ Extremely
Early Alert Systems	☐ Not at all	☐ Slightly	☐ Moderately	☐ Very ☐ Extremely
Not applicable ☐				
To what extent do you think these technologies will improve your work?				
eDNA	☐ Not at all	☐ Slightly	☐ Moderately	☐ Very ☐ Extremely
iEcology	☐ Not at all	☐ Slightly	☐ Moderately	☐ Very ☐ Extremely
Sentinel gardens	☐ Not at all	☐ Slightly	☐ Moderately	☐ Very ☐ Extremely
Citizen science	☐ Not at all	☐ Slightly	☐ Moderately	☐ Very ☐ Extremely
Computer vision	☐ Not at all	☐ Slightly	☐ Moderately	☐ Very ☐ Extremely
Early Alert Systems	☐ Not at all	☐ Slightly	☐ Moderately	☐ Very ☐ Extremely
Not applicable ☐				
How do you expect your work to be affected by the adoption of the IAS detection techniques explored in this living lab? (the ones listed in the questions above)				
☐ Strongly negatively affected ☐ somewhat negatively affected ☐ not affected				
☐ somewhat positively affected ☐ strongly positively affected				
What factors influence your willingness to adopt new detection and monitoring tools?				
☐ Costs ☐ Reliability ☐ Ease of use ☐ Policy alignment ☐ Training availability				
☐ Public perception ☐ Other, please specify:				
Do you have the authority or resources to influence the adoption of novel IAS detection technologies in or beyond your organisation?				
☐ Not at all ☐ Slightly ☐ Moderately ☐ Very ☐ Extremely				
What concerns, if any, do you have about the integration of digital tools into invasive non-native species management? Please explain:				

Thank you for completing this survey!

