

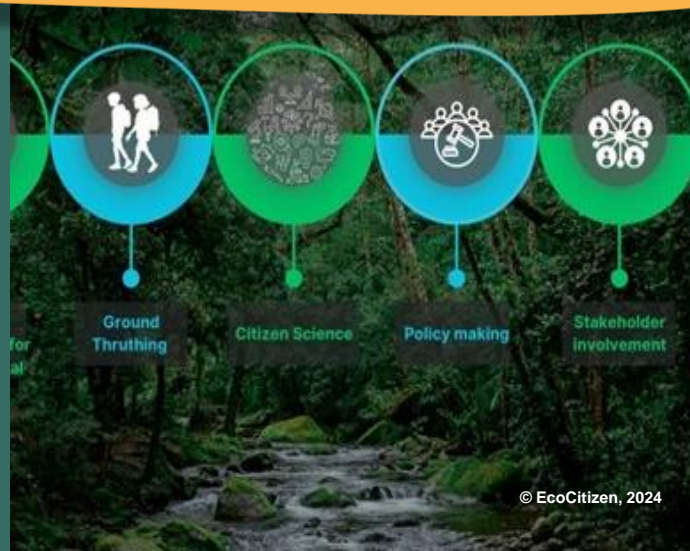
## User-driven digital app enhances ecosystem monitoring and awareness in rural Luxembourg



### SUMMARY

The ANNE-MARIE project (Automated Nexus for Natural Ecosystems: Mobile Application and Remote-sensing Integrated Environmental data) developed a commercial feasibility study of a **mobile application to improve environmental monitoring of ecosystems** such as forests in rural Luxembourg and Costa Rica. These areas often face challenges such as limited access to technology, insufficient ecosystem data, and low citizen engagement in social-ecological issues.

Through **workshops and co-creation sessions** involving over 70 participants, including high school students and trainee engineers, the project created a user-friendly app prototype. The app is geared to young users and leverages **gamification and interactive educational content to encourage community involvement in data collection**, enhancing the understanding of ecosystems such as forests.



### CONTEXT

Many rural areas in Luxembourg face challenges such as **highly fragmented land ownership, limited access to advanced technologies at the smallholder scale, constrained resources for environmental monitoring, and a lack of public awareness regarding social-ecological issues.**

Over half of Luxembourg's forests are owned by private smallholders, which makes it difficult to conduct detailed forest composition surveys. These are needed to ensure effective nature conservation and meet market and societal demands for data on ecosystem services.

There is a need to **scale up environmental data identification and collection and transform this data into practical insights** that directly inform social priorities and economic decisions aligned with EU priorities and objectives.

Young people in these communities often demonstrate limited engagement with socio-ecological challenges, and educational tools to spark their interest were previously unavailable



### OBJECTIVES

- > Conduct a feasibility study to design a mobile application and digital platform for enhanced environmental monitoring;
- > Aggregate visual ecosystem-related data from existing sources and gamify user inputs to improve data accessibility and accuracy in forest ecosystem monitoring;
- > Engage and educate students and professionals on climate change, biodiversity, and space technologies;
- > Develop a replicable, user-friendly tool supporting citizen science.

**Themes:** Research and innovation, education and training, digital, nature and environment, forestry

**Country:** Luxembourg

**Organisations:** EcoCitizen, research institution

**Start & end date:** 03/2024 - 10/2024

**Budget:** EUR 80 000

**Funding sources:** European Space Agency (ESA), BASS ARTES 4.0 programme, own funding

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## ACTIVITIES, KEY ACTORS, AND TIMELINE

The ANNE-MARIE project followed a structured and iterative approach.

### 1. Initial planning and feasibility study

- > Facilitators from EcoCitizen – the project promoter – **identified key environmental data needs** of the first example ecosystem, focusing on forests and ecosystem interactions.
- > They then conducted a **feasibility study to design a digital service** integrating mobile apps and existing data platforms, ensuring scalability and practicality.

### 2. Co-creation and feedback analysis

- > EcoCitizen experts conducted **science-based workshops involving 63 high school students** from rural and urban Luxembourg, and a workshop with young engineers and researchers from rural areas in Costa Rica during the United Nations Biodiversity Conference (UN CBD) COP16.
- > Participants engaged in educational and interactive lectures on climate change, biodiversity, and space technologies, and interacted with a range of existing citizen science apps.
- > Surveys and poster presentations were used to outline desired app features, gathering **feedback on user preferences**. Workshop facilitators guided the sessions to refine user requirements based on feedback.

### 3. Prototype development and business planning

- > **Empathy maps and needs assessments** were developed to align the app design with user challenges and goals.
- > A **prototype** of the gamified app was designed, incorporating educational content, photo storage, and interactive challenges.
- > A **business model** canvas and a comprehensive **business plan** were developed to ensure the app's long-term viability and sustainability.



## RESULTS

The key result of the project is the **complete commercial feasibility study** and the development of a prototype **user-centric mobile app and digital platform for environmental monitoring**.

The app, designed through feedback-driven co-creation, integrates gamification, educational elements, and tools for photo storage. It enables local communities to contribute to forest ecosystem data collection and to support research and policy development for sustainable environmental management.

The project **raised awareness of ecological issues** through workshops, inspiring over 70 participants to engage in citizen science and improving understanding of ecosystems through **participatory data collection and education**.



## SUCCESS FACTORS/LESSONS LEARNT

### Success factors

- > **User-centric approach:** engaging participants early in the design process ensured the app met real user needs, increasing its accessibility and effectiveness.
- > **Gamification and education:** incorporating interactive, game-like features motivated participants while promoting ecological awareness and knowledge sharing.
- > **Collaboration:** partnering with high school students, trainee engineers, and educators created a strong network of stakeholders actively contributing to success of the app.

### Lessons learned

- > **Adaptability:** flexibility in responding to feedback and technological challenges was crucial for refining the app and ensuring user satisfaction.
- > **Scalability potential:** the participatory model demonstrated its value in creating replicable solutions that can be adapted to diverse regions and ecosystems.
- > **Sustainability integration:** combining financial and environmental considerations into the business model ensured long-term viability and impact of the project.



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