SP2-ACT4D-Eutrophication Hackatons

1.Introduction

Environmental hackathons are intensive collaborative events that bring together people from different disciplines to develop innovative solutions for environmental challenges within a limited period. Unlike traditional conferences or academic workshops, hackathons emphasize rapid experimentation, teamwork, and practical implementation. Participants work under time pressure to transform ideas into prototypes, digital tools, analytical models, or strategic concepts that can address real environmental problems.

These events usually focus on issues such as climate change, pollution, waste management, renewable energy, sustainable urban development, biodiversity conservation, and water resource management. What makes environmental hackathons particularly valuable is their interdisciplinary nature. Software developers, engineers, environmental scientists, designers, economists, urban planners, entrepreneurs, and policy specialists collaborate in mixed teams, combining technical expertise with scientific knowledge and social understanding.

A successful environmental hackathon begins with a clearly defined challenge. Participants need to understand not only the environmental problem itself, but also its broader social, economic, and geographical context. Well-structured problem statements help teams focus their efforts on realistic and measurable objectives, such as monitoring air pollution, improving waste collection systems, predicting flood risks, or optimizing energy consumption in urban areas.

Environmental hackathons are dynamic, short-term events where multidisciplinary teams collaborate intensively to develop solutions to environmental problems.

Components of a successful environmental hackathon:

- A clear definition of the problem or challenge.
- Access to data, particularly regarding:
  - pollution levels;
  - socio-economic statistics;
  - geospatial data;
  - and infrastructure elements.
- Rapid validation of ideas, transforming theoretical discussions into practical implementation.

Access to reliable and relevant data is another essential component. Environmental innovation depends heavily on information such as pollution measurements, socio-economic statistics, geospatial datasets, satellite imagery, climate records, and infrastructure data. Open-data platforms and environmental monitoring systems provide participants with the resources needed to analyse problems accurately and design evidence-based solutions. The increasing availability of Geographic Information Systems (GIS), remote sensing technologies, and

Internet of Things (IoT) sensors has significantly expanded the possibilities for environmental hackathon projects.

One of the defining characteristics of these events is the rapid validation of ideas. Rather than remaining at the level of theoretical discussion, teams are encouraged to create functional prototypes and test their concepts within the short duration of the event. This process allows participants to quickly evaluate the feasibility, usability, and potential impact of their solutions. Mentors and experts often support teams by providing technical guidance, scientific expertise, and practical feedback throughout the development process.

Environmental hackathons also play an important educational and social role. They encourage innovation, strengthen interdisciplinary collaboration, and raise awareness about sustainability issues. Participants develop not only technical competencies but also communication, teamwork, and problem-solving skills. At the same time, these events create opportunities for cooperation between universities, public institutions, private companies, non-governmental organizations, and local communities.

In recent years, environmental hackathons have increasingly incorporated advanced technologies such as artificial intelligence, machine learning, cloud computing, and big data analytics. These technologies enable participants to address complex environmental challenges more effectively by improving prediction models, optimizing resource management, and supporting data-driven decision-making.

Despite their many advantages, environmental hackathons also face certain limitations. The short timeframe can restrict the depth of project development, and many promising ideas struggle to continue after the event ends. For this reason, long-term support mechanisms such as incubation programs, research partnerships, funding opportunities, and pilot projects are essential to transform prototypes into sustainable real-world solutions.

Overall, environmental hackathons represent a dynamic and innovative approach to environmental problem-solving. By combining collaboration, technology, scientific knowledge, and rapid experimentation, they create a productive environment in which creative ideas can evolve into practical solutions with meaningful environmental and social impact.

2. ACT4D-Eutrophication Hackathons

During the summers of 2024 and 2025, four environmental hackathons were organized with the participation of students from University of Bucharest, Alexandru Ioan Cuza University of Iași, and Ovidius University of Constanța. These events were developed through interdisciplinary collaboration and focused on identifying innovative solutions to environmental and spatial planning challenges.

The hackathons were organized in partnership with representatives of CCMESI within the University of Bucharest and the Faculty of Geography and Geology of the Alexandru Ioan Cuza University of Iași.

Each event brought together between 20 and 30 participants, creating an interactive working environment that encouraged experimentation, collaboration, and applied learning.

Students worked in teams of four to six members and engaged in iterative co-creation processes, continuously refining ideas and solutions throughout the activities. The hackathons combined both analytical and participatory approaches, integrating methods such as participatory GIS and collaborative mapping exercises. Participants analyzed topics related to land use, functional spatial zoning, environmental management, urban planning issues, and biodiversity conservation.

The activities also incorporated educational games and scenario-based exercises designed to stimulate critical thinking and collaborative decision-making. Through these methods, students explored complex environmental and territorial challenges while developing practical skills in spatial analysis, teamwork, and sustainable planning.

The events demonstrated the value of environmental hackathons as platforms for interdisciplinary education and innovation, offering participants the opportunity to connect theoretical knowledge with practical applications in environmental governance and territorial development.

Figure 1. Hackathon Summer 2024

Figure 2. Hackathon 30th June- 2nd July 2025

Figure 3. Hackathon 14-15th July 2025

Figure 4. Hackathon 14-15th July 2025

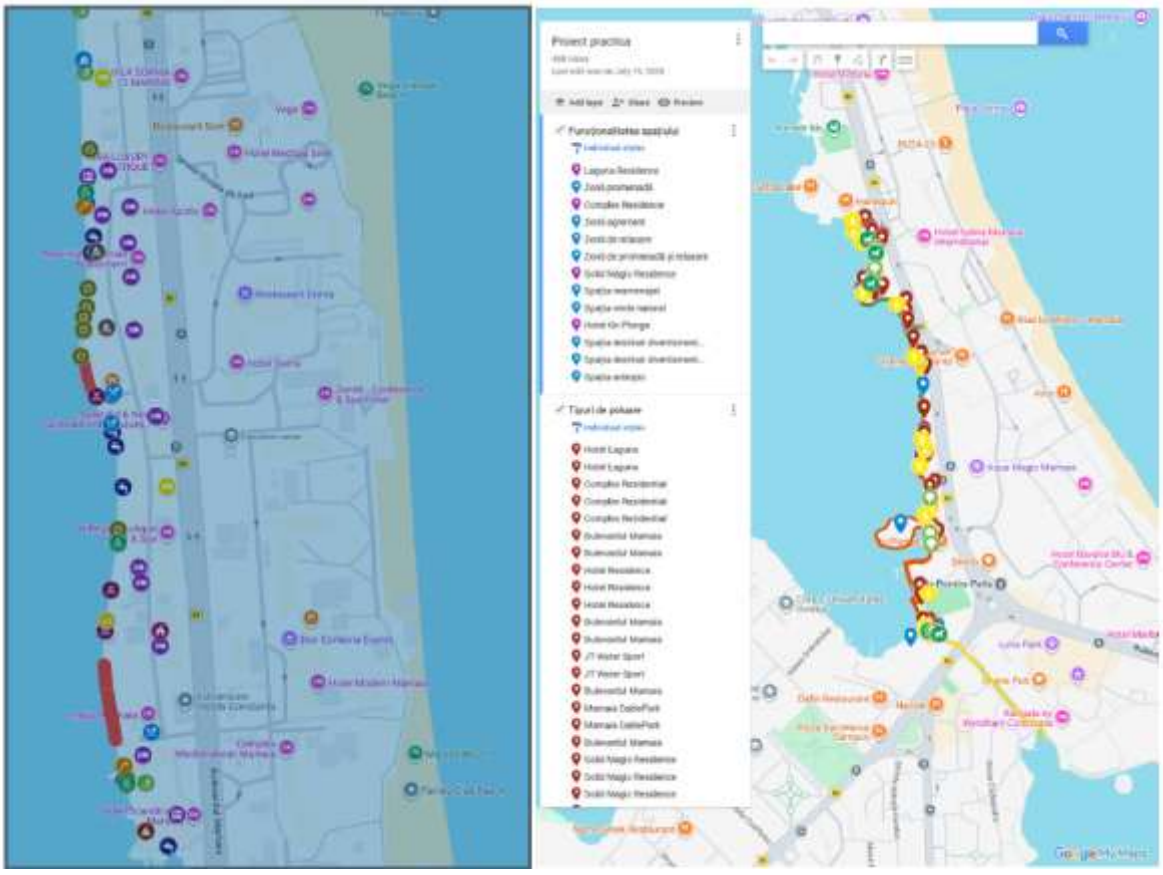

Figure 5. Hackathon-GIS participative

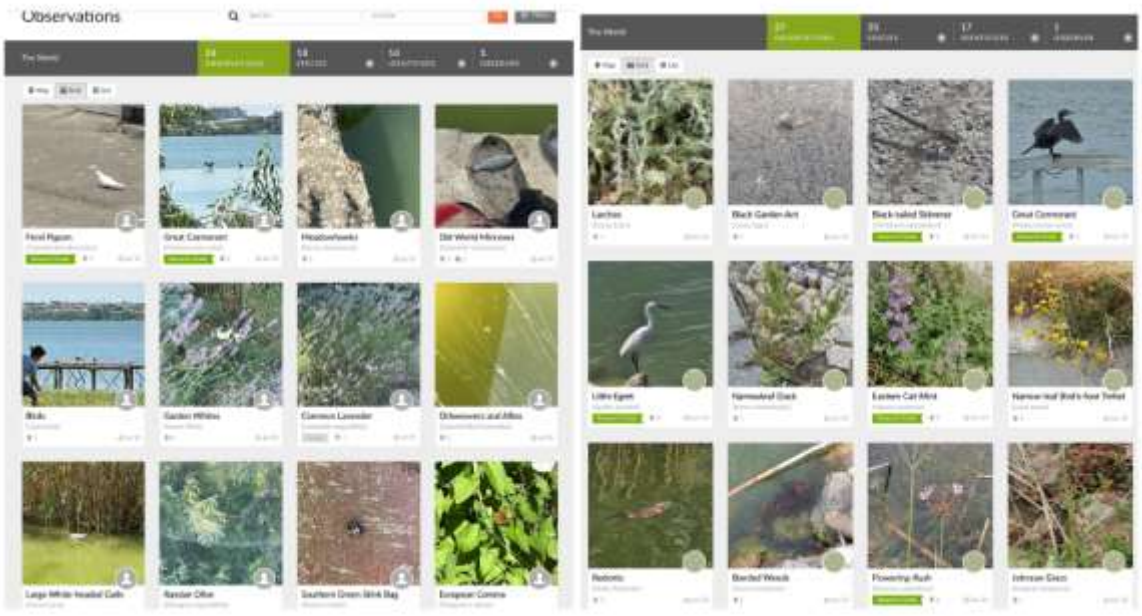

Figure 6. Biodiversity Mapping Hackathon

Figure 7. Hackathon - Mapping and analysis of problems

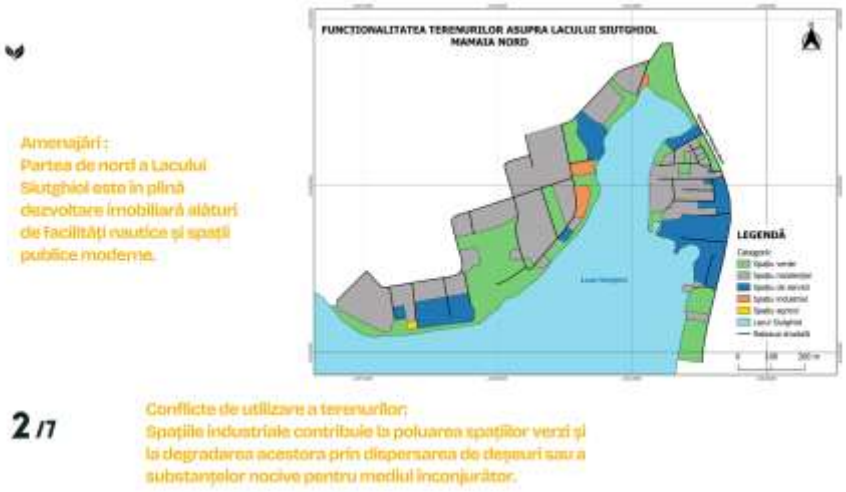

Figure 8.

Challenges and limitations

Challenges and limitations associated with using hackathons to solve environmental problems:

- Oversimplification of problems so that an effective solution can be found and developed in a short period of time.
- The short lifespan of the proposed solutions.

- The risk of deviating from scientific rigor in favour of “catchy” solutions that “catch the eye” or are popular at the moment.

The main difficulty arising from the participatory approach systems from the system’s inertia:

- measures to remedy the problem do not yield immediate results, and participants may lose interest or motivation long before the actual effects of the proposed measures become apparent.