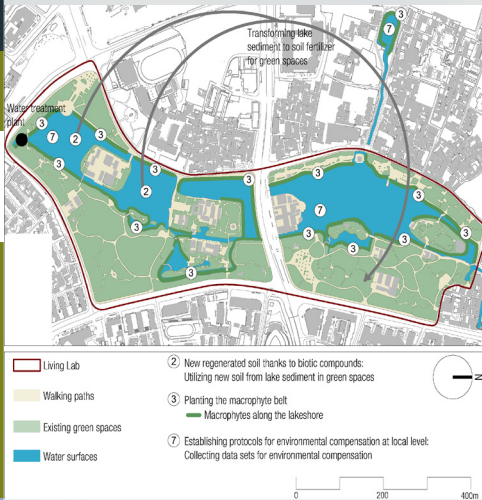




# Living Lab Ningbo



## Deliverable 3.5 Implemented Living Lab in Ningbo, China



MOON LAKE PARK

## Vision, goals and management of the Living Lab



Moon Lake urban structure and aquatic plants

### Vision for the Living Lab Moon Lake, Ningbo

Ningbo aims at high quality recreation areas and popular science/education base with increased sense of citizen and stakeholder co-ownership. To achieve environmental fairness by creating a multifunctional complex ecosystem, an ecological wetland purification system with continuous water circulation

### Living Lab Ningbo overview

Ningbo is a sub-provincial city in the northeast Zhejiang Province, People's Republic of China, with prefecture-level city status. The city is a typical case of rapid urbanisation in the eastern coastal region of China, facing multiple challenges concerning green and blue areas, e.g. contamination, low quality and lack of green spaces due to construction and spread of grey infrastructure.

The Living Lab in Ningbo is located around Moon Lake and Moon Lake Street in the downtown area of Ningbo City, with an area of only 2.07 km<sup>2</sup>. It has jurisdiction over seven communities, with a population of 25,750 people and a density of 12,440 inhabitants/km<sup>2</sup>. In 2017, Ningbo City's overall green area amounted to 11.89 m<sup>2</sup>/inh., and the green area of Moon Lake Street about 11.5 m<sup>2</sup>/inh., which was lower than China's per capita park green area of 14.01 m<sup>2</sup>/inh. Therefore, Ningbo's green infrastructure system needs to be continuously strengthened.

Moon Lake is an urban lake located in a central urban tourist area with many hotels and

restaurants nearby. However, the lake water is polluted, requiring water quality purification urgently. Overall, the Moon Lake area offers many opportunities that may play a key role in transforming the area with successful NBS implementations. Key features of the Living Lab Moon Lake can be summarized as follows:

- Economy, population and buildings are concentrated in the eastern part of the urban Haishu District, while the west of Haishu District has lower economic activities;
- High population density and excessive tourism, entertainment and hotel facilities affect the living environment of local residents;
- Large population, resulting in insufficient capacity to provide specific medical services. A large number of migrant workers may cause social instability and security problems;
- Unevenly distributed green space: Western area with low population density has large green spaces;
- Noise and dust pollution caused by renovation of old buildings;
- Risk of typhoons, causing casualties, crops

- and large vegetation lodging.
- Poor air quality affects residents' health,
- Severe water pollution in some rivers and lakes and hot weather conditions due to climate change exacerbate blooms.

### Challenges and Goals

Given the Moon Lake Street's challenges as mentioned above, some of the weaknesses and necessities have been turned into opportunities and used as strategic starting points for several NBS implementations. Planned NBS 2, which would have converted the lake sediment into soil fertilizer was cancelled due compounds of soil heavy metals and soil degradation.

The NBS implementations in the proGReg research project's Living Lab Moon Lake pursue the goal of addressing social, economic and urban problems. The Living Lab approach entails testing specific NBS in real life settings by involving stakeholders and citizens at an early stage in co-design and co-implementation processes (based on the quadruple helix approach). Aimed at boosting collaborative and long-lasting engagement including vulnerable and marginalised groups. Key beneficiaries are residents living around Moon Lake Park, disabled people, visitors and tourists.

Key challenge is to improve the water quality of Moon Lake. Therefore, the main water quality indicators are key factors to release the ecological comprehensive control project on the lake, seeking to reach IV class, and reaching

III class in the near future. During the project's duration, improving the self-purification ability of water bodies through ecological technology proved to be difficult. The project combines systematic and comprehensive ways to deal with the issue. The continuing technical output will require sufficient funds to support the official financial plan.

Severe Covid-19 pandemic restrictions in China and stakeholders' financial condition are critical factors that may hamper the benefit for the target groups.

### Living Lab Management

Given the implemented NBS interventions in the Ningbo Living Lab (two of proGReg NBS) and the complexity and necessary expertise for specific NBS required the involvement of local stakeholders beyond the official proGReg local partners.

Following an initial plenary meeting involving all relevant stakeholders, Ningbo created three "boards" with the purpose of managing the planning activities within proGReg (fig. 1). Each group designated a specific proGReg partner as coordinator of each board's activities. To guarantee a shared planning process among the Living Lab local partners, the City of Ningbo (Forestry Bureau of Ningbo City) acted as coordinator. The core team managed the coordination and exchange activities across the project's phases. Three working groups took over different tasks. Enterprises were also introduced to the project cooperation.

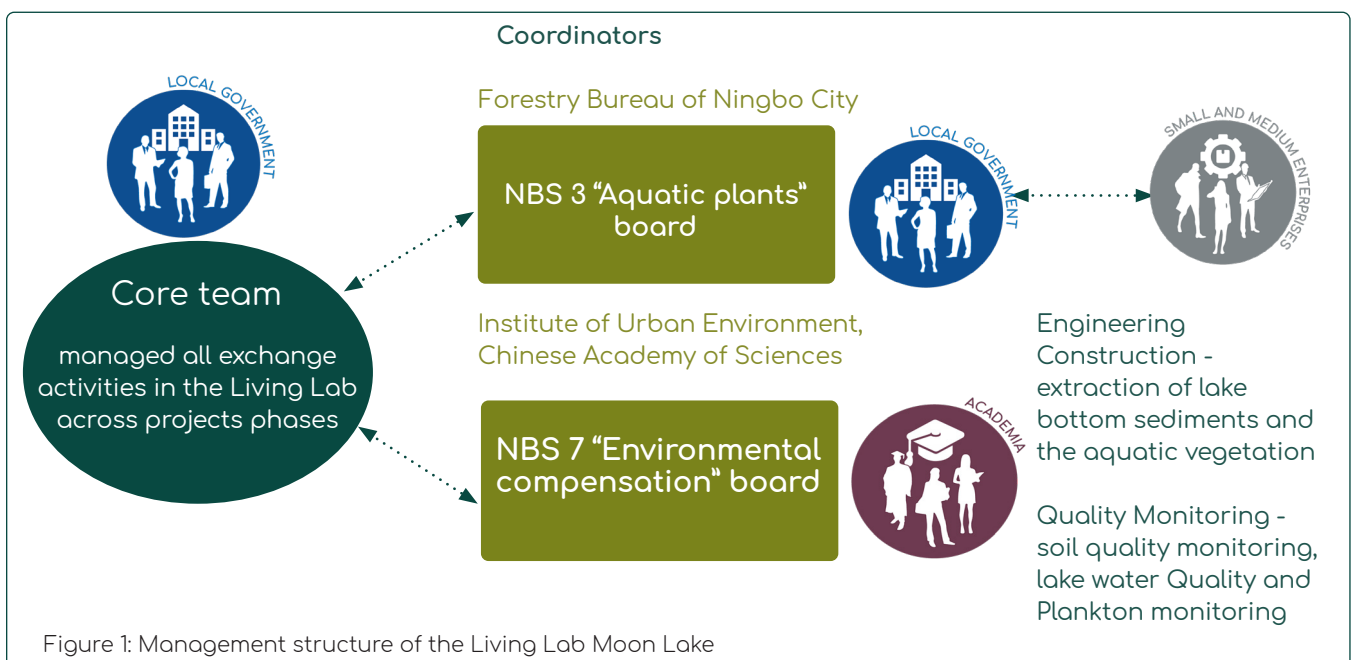
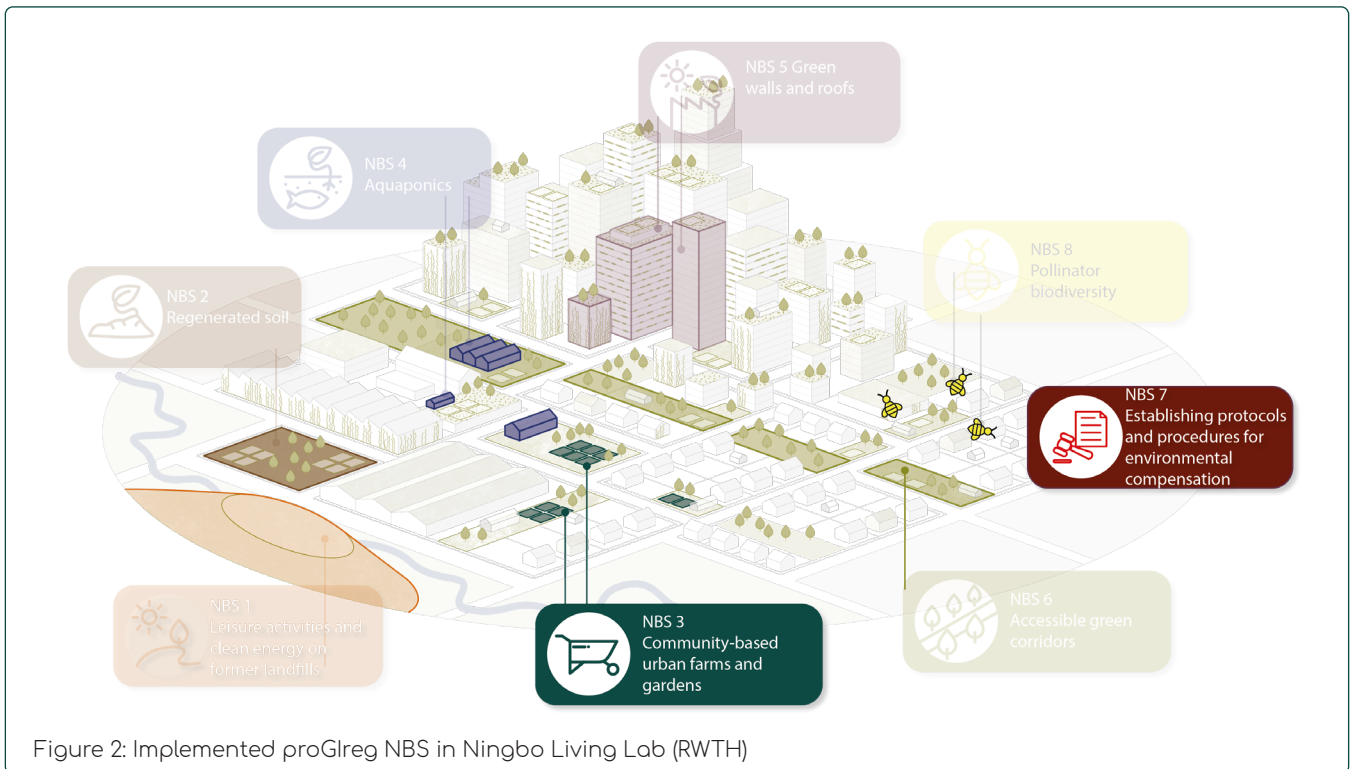


Figure 1: Management structure of the Living Lab Moon Lake

## Co-design activities



The co-design activities together with the pre-implementation activities represented first and crucial steps in the Living Lab allowing to:

- Inform and involve stakeholders and citizens
- Resolve administrative barriers to start working operatively in the field

In most cases, the aim of the co-design process is to achieve the participants' buy-in of NBS to create identification and foster the development of finding ways to safeguard the NBS, social awareness and citizen ownership. Given each NBS implemented is context-specific, a flexible approach to matching context-based and technical issues is required. This is also reflected in the degree of engagement, varying from simple information to active participation in implementation and maintenance activities. Some common methodological features to describe the co-design approach are outlined in the following:

- Carrying out stakeholder mapping together with a social analysis of beneficiaries in order to better understand the social composition of the area and identify the residents living around Moon Lake Park and people who come to the park for tourism and disabled groups.
- Design and implementation of engagement

activities were carried out by field experts, stakeholder with sound experience and deep knowledge of the territory

- Producing documentation, i.e. guidelines, dissemination materials, event documentation to support and communicate the engagement process

### Outcomes, challenges and lessons learnt

The Living Lab Ningbo initially envisaged to co-design and implement three different NBS. However, during the co-design process, it emerged that NBS 2 (Regenerating new soil from lake sediment) had to be cancelled due to the high content of heavy metals in the sediment, hence not allowing to be converted into new soil.

Ningbo implemented two NBS (fig. 2). NBS 3 addresses water pollution and enhance the Moon Lake as a recreational area. NBS 7 addresses new ways of continuing to improve green infrastructure management. The NBS implementation can serve as pilots to guide other projects and plans. During the project timeline, the Covid-19 pandemic hampered co-design activities greatly, goals changed due to partner and stakeholders' personal issues. Moreover, financial conditions also had critical effect.

Given the Chinese context, governance and cultural differences impacted co-design processes in particular. In addition, the Living Lab is not affected by post-industrial challenges but the central location exerts pressure on improving the urban environment for residents and tourists.

 **NBS 3**  
Community-based urban farms and gardens

It is necessary as a city to monitor and manage the urban greening with the joint government, residents and stakeholders. The purpose of co-design is to obtain environmental effects through long-term supervision and monitoring of the pilot area in the Living Lab Moon Lake, drawing the following conclusions:

Obtain basic information about the pilot area:

- The location of the Living Lab and the introduction of communities, green area, population and density.

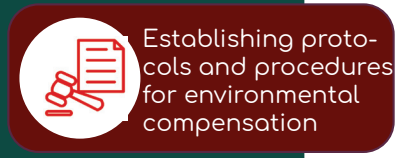
Weaknesses and challenges in this area:

- Crowded streets around Moon Lake with many old residential quarters, old buildings, old streets, and old markets behind the high-rise buildings, with aging equipment and facilities and many remaining problems. With aging infrastructure, insufficient modern facilities, and difficulties in coordinating group interests. Some polluted water bodies with seasonal stench have appeared

Main obstacle in this area:

- Ecological and environmental restoration is difficult and costly. Since Moon Lake is located in the city centre, it is difficult to construct green foundations, thus restricting further development of Moon Lake's green infrastructure.

The NBS focused on collaboration between institutional stakeholders and private sector actors to address administrative procedures and protocols.



Establishing protocols and procedures for environmental compensation

**NBS 7 stems from the Moon Lake Water Ecological Comprehensive Improvement Project.**

Moon Lake forms the centre and heart of Ningbo city, being a landmark with a strong local identity attached to it. In order to cooperate with Tianyi Pavilion and Moon Lake to create a national tourism 5A-level scenic spot, there is urgent need to improve the water quality of Moon Lake and beautify Moon Lake Park to adapt it to the requirements of a 5A-level scenic spots.

Given Chinese governance structures, stakeholders from diverse backgrounds agreed that the development and governance of Moon Lake Park requires multi-party cooperation in the long run. However, participatory processes are not common in China and Chinese people are not accustomed to participatory co-design processes. Stakeholders are particularly reluctant to pro-bono participation in workshops without no or few economic benefits.

## Living Lab results and outlook



Figure 3: Living Lab map outlining NBS implementation status in Ningbo

### Achievements and lessons learnt

As a relatively developed city in eastern China, Ningbo takes the lead in urban construction and greening, notably in policies such as „Five Water Treatment“ in Zhejiang province and the construction of urban green infrastructure.

The rapid urban development over the last decades happened at the expense of the environment. Now the government, society, urban residents and stakeholders are paying more attention to the construction of urban green infrastructures, requiring the use of scientific methods to carry out a series of urban monitoring and management.

Major achievements and challenges of the Living Lab Ningbo are listed below:

#### NBS 3 - Planting aquatic plants along the shore of Moon Lake

In the Moon Lake Living Lab, planting aquatic plants along the lake was successfully implemented and contributed to beautifying the environment while purifying the water quality. Aquatic plants are being used to

re-nature a 5 km corridor surrounding the urban Moon lake Park in Ningbo. The aquatic plants (fig. 4) improve the water quality by reused water around the lake via water ecological restoration engineering measures. The measures of water ecological engineering



Figure 4: Plantations of aquatic plants around Moon Lake for water purification (c) IUE-CAS

to improve the water environment have been recognized by the government, and the urban lake management scheme is being vigorously promoted.

### NBS 7 - Procedures for environmental compensation

Local environmental compensation procedures include ecological compensation measures of Moon Lake to purify the water quality. The implementation consisted of dredging at the bottom of the lake, planting aquatic plants, and finally judge whether the water quality standard is reached through the long-term series of water quality sampling, and carry out ecological environmental compensation according to the final standard. The implementation of environmental procedure compensation in Ningbo Moon lake provides a certain reference for the formulation of standards. In parallel, it enriches the diversity of environmental compensation methods. At present, the city of Ningbo has completed environmental compensation according to the assessment methods for improving water quality and the assessment methods for maintaining and cleaning Moon Lake.

This activity is based on the PPP (Public-Private Partnership) project of Moon Lake Water Ecological Comprehensive Improvement Project. In the field of public services, PPP means that the government adopts a competitive approach to select social capital with investment, operation and management capabilities. The two parties conclude a contract based on the principle of equal negotiation, and the social capital provides public services. The government pays compensation to the social capital based on the results of public services.

## Outlook

The Zhejiang Provincial Party Committee Proposed the Introduction of the „Five Water Treatment“ to transform and upgrade the Water Management by friendly interest, preventing flood, draining flooded fields, guaranteeing water supply and emphasizing water conservation. The move will have important effect to moon lake water quality in the future, to improve the moon lake water quality, improve the comfortable degree of residents and life experience.

### Water quality

Ningbo is continuing to monitor the implemented NBS 3 for improving the water quality of the man-made Moon Lake. Further Living Lab implementation will need to be contextualized within the existing implementation (aquatic filtering plants, fry fish, pumps for oxygenizing the water, water filter, new bamboo plantings) to support past and ongoing initiatives with complementary NBS 3 and NBS 7. The water ecological engineering measures to improve the water environment have been recognized by the government, and the urban lake management scheme is being vigorously promoted.

On the lake ecological comprehensive control project within one year after the completion of the main water quality indicators will reach IV class, reaching III class for two years. Water quality purification and ecological restoration projects will continue to remove pollutants in water bodies through moderate human intervention; improve self-purification ability of water bodies through ecological technology.



Aquatic plants on Moon Lake



Ningbo Living Lab

Contact:

✉ gluo@iue.ac.cn



🌐 [www.progireg.eu](http://www.progireg.eu)

🐦 @proG!reg

in proG!reg-project

📘 proG!reg: Nature for Renewal

📷 #proG!reg

📺 proG!reg: Nature for Renewal

📺 proG!reg: Nature for Renewal

## Partners



The sole responsibility for the content of this publication lies with the authors and any use that may be made of the information contained therein. It does not necessarily represent the opinion of the European Union or the REA.



This project has received funding from the European Union's Horizon 2020 innovation action programme under grant agreement no. 776528.