



Task 6.6 Buddy System Activities - WEBINAR #4 Summary

Hong Kong: 2050 Water and Climate Vision

Organized by RINA-C in collaboration with Hong Kong Polytechnic University

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UNALAB CITIES WEBINAR #4

Hong Kong: 2050 Water and Climate Vision

1) **Introductory part: presentation of the latest Buddy System updates and introduction to the webinar topic**

The latest updates in the framework of the Buddy System activities concern the reorganization of the “Buddy Space”, the UNaLab website section dedicated to the Buddy System:

- the information shared and collected until now during the webinars, workshops and collaborations among cities are organized in three new sections divided per topic: NBS for water management, NBS for urban growth and densification and NBS for Biodiversity;
- it has been uploaded a document that summarizes all the suggestions and feedbacks received from the cities during the Prague workshop, concerning the future Buddy System activities;
- it has been uploaded a template to track the collaborative activities (exchange of information and material) among the cities, in order to make them public to benefit the other cities.

The webinar topic: “Hong Kong: 2050 Water and Climate Vision” has been chosen not only to give the city of Hong Kong the possibility to share its researches, studies, good practices and NBS implemented to mitigate the climate change effects, but also to give all the UNaLab cities an extra European city perspective on the NBS related topics, especially focused on the tools and methodologies to help the implementation and monitoring of these solutions.

2) **The general introduction to Hong Kong and its involvement in the UNaLab project**

- Introduction to Hong Kong

The main environmental stresses of the city are:

- Frequent typhoons and rainstorms
- Serious urban heat island effect
- High population density
- Limited open space

The government environmental management initiatives include:

- River restoration project
- Roof greening project

- Goals and Objectives

Research objectives related to UNaLab:

- Develop integrated porous pavement systems as a Nature Based Solution
- Adopt NBS and implement them locally through “living labs”
- Perform life-cycle cost analysis, life-cycle assessment and social impact analysis of the developed NBS

- Monitoring Process

Monitoring programs implemented:

- Water quality test
- Biodiversity observation
- UHI and thermal performance of green buildings
- Resilience of NBS infrastructures

- Expected Results

- Evaluate the environmental performance of the natural conditions, related to the rivers restoration, and the urban conditions, concerning the green buildings (e.g. green roofs)
- Propose new NBS which is not only effective, but also adaptive to the local climate condition
- Evaluate the environmental problems and optimize the NBS in the city

3) Assessment of water quality of rivers restored from urban drainage channels

Description of the water quality monitoring (May – November 2018) of the upstream and downstream restored rivers:

- Case I: Ma Wat River (MWR)
- Case II: Lam Tsuen River (LTR)

The two concrete covered rivers were revitalized and brought back to more natural states (removal of concrete beds, construction of vegetated, channel embankments, geo-fabric reinforced grass, lining and gabions, re-creation of the meanders).

The monitoring based on different parameters divided into physico-chemical, solids content, aggregate organic constituents, nutrients, pathogens and trace metals categories, showed two different results:

- Ma Wat River (MWR) – water quality improvement
Due to the presence of:
 - small waterfalls
 - pools and riffles
 vegetated palm roll “islands” (nutrient uptake by roots, photosynthesis activities add oxygen)

b) Lam Tsuen Rivers (LTR) – water quality deterioration

Due to:

- the lack of beneficial features like the heterogeneity and the sinuosity (lesser than case I)
- the presence of two small drainage pipes that introduce pollutants

4) How to evaluate the biodiversity of urban green spaces from the perspectives of AEC practitioners

Considering the critical role played by the (UGS) Urban Green Spaces in biodiversity protection by providing habitat to wild lives, and the important role of (AEC) architectural, engineering and construction practitioners in designing, constructing and maintaining UGS, how can AEC practitioners assess the biological value of the urban facilities designed and built by them?

Description of the methodology:

- I. to assess the biodiversity indicators for each Urban Green Space through evaluation of the selection criteria, using both online and face-to-face stakeholders' surveys;
- II. to develop the monitoring process and biodiversity evaluation methods through case studies, using the biodiversity indicators previously assessed:

- Case 1: Ma Wat River (MWR)
- Case 2: Lower Lam Tsuen River (LLTR).

The six months monitoring results obtained, based on birds, fish, dragonflies and vegetation, showed that:

- Birds:
Case1<Case2 – due to: - Noise disturbance
- Wooden poles damage
- Fish:
Case1>Case2 – due to: - Water body size
- Fish ladder
- Higher diversity vegetation in water
- Dragonflies:
Case1>Case2 – due to: - Vegetation diversity
- Waterfowl disturbance
- Habitat size (diverse features)
- Vegetation:
Case1>Case2 – due to: - Site area
- Irregular shape
- Dominant exotic species

5) Monitoring of the Nature Based Solution – Resilience of the river restoration projects in a subtropical climate: case studies in Hong Kong

The research aims to:

- develop a framework for evaluating the resilience of infrastructure projects, considering the interrelationships between resilience concepts (complex adaptive system resilience, system resilience, engineering resilience)

- apply the framework to assess the resilience of two river restoration projects in Hong Kong:
 - description of the system – monitoring period, content, functions and features
 - identification of system functions – characterization of the disturbances and their impacts
 - identification of resilience measurement methods - measurement of engineering resilience, measurement of system resilience and measurement of complex adaptive system resilience
- give out proactive design and adaptive operation management strategies recommendations, through results analysis (e.g. exclude vulnerable and non-restorative design features, appropriate plant selection, continuous monitoring)

6) NBS monitoring measures and results – Urban Heat Islands (UHI) and thermal performance of green space

Description of the methodology used to assess the UHI and the thermal performance of green space and related to:

- the identification of the Urban Heat Island (UHI) effects in Hong Kong from high-resolution satellite images and remote sensing technique;
- the identification of the local environments' features by thermal camera;
- the identification of how land use and local features influence Urban Heat Island effect;
- the optimization of the current NBS in cities

The analysis results indicate that:

- areas with relatively high temperature in Hong Kong are mainly located in the urban built-up zones, roads and industrial areas;
- the water bodies and green spaces have beneficial roles in reducing UHI effect;
- it is necessary to focus on the local thermal environment and analyze the performance of different kinds of green spaces on thermal comfort;
- some micro factors (the mass, type, leaf area of green covers, concrete material and surface texture) all affect the UHI effect.

7) Questions and answers

- Who was the “project owner” for the river revitalization project? Who was collaborating in the project? the city (project design and realization) and the university (monitoring)?

The Government Drainage Services Department (DSD) is in charge of the project design and realization of the river revitalization projects (there are 4 study cases). The Hong Kong Polytechnic University is dealing with the monitoring of the sites.

- How do you collaborate with the city? How does this relationship work?

The collaboration with the city managers is good, in particular because part of the project is related to the research and implementation of porous pavement. The

University is helping with it and the Government is really interested in the outcomes.

- What about the financing aspect of these monitoring activities, are they all financed by the Government? Are there financing programs?

UNaLab project supported the monitoring of quality management giving the possibility to have students and a specific research staff working on it.

- What about the legislative framework, are there rules and regulations about biodiversity?

There is a legislative framework in Hong Kong approved by the Government: the White Paper of Hong Kong.

- Is there a legislative framework on biodiversity in the other cities? Biodiversity is a priority?

In Eindhoven there are no laws, but locally they are working on rules for building materials: “nature inclusive constructions”, and they have long term plan for biodiversity enhancement. They are having a good response in greening and improving the biodiversity of the city (e.g. resting places for birds, five types of animals etc.), and they consider the citizens’ education and information very important.

In Hong Kong there is more top down approach than a collaborative and proactive attitude of the citizens (the communication is probably better in other cities).

In Eindhoven is more or less the same, there is a big difference in knowledge of the citizens: there are small groups that knows a lot on these topics and that try to get more people interested.

- Concerning the social study that you conducted on the impact that the NBS have on the citizens, what results did you obtain and how did you use them?

The Hong Kong University is still summarizing the survey, but until now the public feedbacks are quite positive. The resilience is assessed as a priority, so the negative comments received are mainly related to a possible lack of resilience of this kind of projects, considered in this case a waste of money.

- What are your suggestions for a city that would like to start a monitoring activity?

Hong Kong University will share a document that deepen the biodiversity monitoring topic: how they proceed with the entire process.