ENV-462

Urban Green&Blue infrastructure and global warming

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Cursus	Sem.	Type
Environmental Sciences and Engineering	MA2, MA4	Opt.
Systèmes urbains	MA2, MA4	Opt.
Territories in transformation and climate minor	E	Opt.

Language of teaching	English
Credits	3
Session	Summer
Semester	Spring
Exam	During the semester
Workload	90h
Weeks	14
Hours	**3 weekly**
Courses	2 weekly
Project	1 weekly
Number of positions	

Summary

The course introduces the concept of green and blue urban infrastructure in the context of global warming. It presents knowledge, concepts, and methods for planning, developing, and maintaining an effective network of green and blue infrastructure in urban areas.

Content

With over 60% of the world's population expected to live in cities by 2030, global warming poses a significant challenge to urban development. However, by positively impacting the urban environment, "green" (plant-based) and "blue" (water-based) infrastructures can help cities adapt and remain resilient in the face of climate change.
Green and blue infrastructure enhances city living conditions by reducing heat islands, controlling runoff water, filtering the air, depolluting water, protecting soil, and promoting biodiversity. They also provide essential services that support the physical and mental well-being of the urban population. In many cases, its cost-benefit ratio is more advantageous than that of conventional grey infrastructure.
This course introduces the concept of urban green and blue infrastructure (UGBI) through six thematic modules:
1. Concept and definition of UGBI
2. Rainwater management
3. Mitigation of the urban heat island
4. Urban ecology and biodiversity
5. Human health and well-being in urban environments
6. Climate-resilient urban development.

The course enables students to familiarise themselves with the following issues:
- Urban challenges linked to climate change;
- Ecosystem services provided by green and blue infrastructures;
- Assessment and strategic planning of green and blue infrastructure in urban areas;
- Design, implementation and maintenance of green and blue infrastructure;
- Functional monitoring and cost-benefit assessment of green and blue infrastructure projects.

The course places great emphasis on practical experience and case studies. It identifies key concepts and best practices for the urban development of green and blue infrastructures. It features contributions from recognised experts and practitioners.

Keywords

Green and blue infrastructure, nature-based solutions, ecosystem services, climate change, resilient cities, and biophilic design.

Learning Prerequisites

Required courses

The course has no prerequisites. However, a good understanding of Geographic Information Systems

(GIS) and a good command of QGIS will be an asset. Some of the lectures will be given in French with teaching summary in English.

Learning Outcomes

By the end of the course, the student must be able to:

- Define the concept of green and blue infrastructures and their contribution to the adaptation of cities to climate change.
- Analyze the type, density and distribution of green and blue infrastructure in an urban area.
- Design a strategic plan to develop an urban network of green and blue infrastructure that is ecologically, economically and socially efficient.
- Describe good practices for designing, building, maintaining and evaluating different urban green and blue infrastructure networks.
- Assess / Evaluate the state and availability of ecosystem services provided by green and blue infrastructure in a given area.
- Define the concept of green and blue infrastructures and their contribution to cities' adaptation to climate change.
- Design a strategic plan to develop an ecologically, economically and socially efficient urban network of green and blue infrastructure.
- Apply good practices for designing, building, maintaining and evaluating different urban green and blue infrastructure networks.

Transversal skills

- Set objectives and design an action plan to reach those objectives.
- Plan and carry out activities in a way which makes optimal use of available time and other resources.
- Identify the different roles that are involved in well-functioning teams and assume different roles, including leadership roles.
- Use a work methodology appropriate to the task.

Teaching methods

An interactive course combining theoretical approaches, case studies, field trips,and practical exercises.

Expected student activities

The course is based on group work and requires regular attendance and active class participation. Thus, students are expected to read the course bibliography and prepare practical case studies for individual and group exercises.

Assessment methods

Assessment during the semester:
40% mid term individual in-class test
60% Group project with individual work (20%) and group work (40%)

Supervision

Office hours	No
Assistant.e.s	Yes
Forum	Yes
Others	• Availability of lecturer during the lessons • Contact with the teacher by mail or phone

Resources

Virtual desktop infrastructure (VDI)

No

Bibliography

• Metro Vancouver, (n.d): *Connecting the dots. Regional green infrastructure network resource guide*. Diamond Head Consulting Ltd, Ecoplan International and Calypso Design, for Metro Vancouver, British Columbia, Canada (available Online)

• House, E., C. O'Connor, K. Wolf, J. Israel, & T. Reynolds. (2016). *Outside our Doors: The benefits of cities where people and nature thrive*. Seattle, WA: The Nature Conservancy, Washington State Chapter, 28 p (available online).

• Hansen, R., Rall, E., Chapman, E., Rolf, W., Pauleit, S. (eds., 2017). Urban Green Infrastructure. Planning: A Guide for Practitioners. GREEN SURGE (available online).

Ressources en bibliothèque

- Outside our Doors: The benefits of cities where people and nature thrive / House et al.
- Urban Green Infrastructure. Planning: A Guide for Practitioners / Hansen et al.
- Connecting the dots. Regional green infrastructure network resource guide / Metro Vancouver

Notes/Handbook

Course materials
Documents, articles, case studies, and exercises will be distributed throughout the semester.

Moodle Link

- https://go.epfl.ch/ENV-462