

ENV-462

Urban Green&Blue infrastructure and global warming

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Cursus	Sem.	Type
Environmental Sciences and Engineering	MA2, MA4	Opt.
Territories in transformation and climate minor	E	Opt.
Urban Planning and Territorial Development 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 infrastructure in the context of global warming. It presents practical methods for planning, developing, and maintaining an efficient network of green and blue infrastructure in urban areas.

Content

With over 60% of the world's population living in cities by 2030, global warming represents a significant challenge for urban development. By positively impacting the urban environment, "green" (plant-based) and "blue" (water-based) infrastructures help cities adapt and remain resilient in the face of climate change.

Green and blue infrastructure improves city living conditions by reducing heat islands, controlling runoff water, filtering air, depolluting water, protecting soil, and enhancing biodiversity. It also provides services essential to urban population's physical and mental well-being. Finally, its cost-benefit ratio is, in many cases, advantageous compared with conventional grey infrastructure.

The course introduces the concept of urban green and blue infrastructure from the perspective of urban rainwater management (bloc 1), urban heat island mitigation (bloc 2), urban ecology and biodiversity (bloc 3), human health and well-being in urban environment (bloc 4), and climate-resilient urban development (bloc 5).

It enables students to familiarise 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 national and international experts.

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 cities' adaptation 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 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.
- Assess / Evaluate the state and availability of ecosystem services provided by green and blue infrastructure in a given area.

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

Active participation in the course, reading of course documents, study of practical cases, 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
Assistants	Yes
Forum	Yes
Others	<ul style="list-style-type: none"> • Availability of lecturer during the lessons • Contact with the teacher by mail or phone

Resources

Virtual desktop infrastructure (VDI)

No

Bibliography

- EBP, 2012: *Adaptation aux changements climatiques dans les villes suisses*. Rapport final du 16 août 2012 sur mandat de l'Office fédérale de l'environnement (OFEV). Ernst Basler + Partner (EBP), Berne, 79 p. Disponible en ligne : <https://www.are.admin.ch/are/fr/home/media-et-publications/publications/villes-et-agglomerations/anpassung-an-die-klim>

- 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 Retrieved from:
https://www.nature.org/content/dam/tnc/nature/en/documents/Outside_Our_Doors_report.pdf.
- 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. Retrieved from:
<https://metrovancover.org/services/regional-planning/Documents/connecting-the-dots.pdf>
- New York City, (2005). (October). *High Performance Infrastructure Guidelines: Best Practices for the Public Right-of-Way*. New York City Department of Design and Construction, Design Trust for Public Space. 229pp. Retrieved from:
<https://www.nyc.gov/assets/ddc/downloads/Sustainable/high-performance-infra-guidelines.pdf>.
- OFEV (éd.), 2018 : *Quand la ville surchauffe. Bases pour un développement urbain adapté aux changements climatiques*. Office fédéral de l'environnement, Berne. Connaissance de l'environnement, No 1812 : 109 S. Disponible en ligne :
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Notes/Handbook

Course materials

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

Moodle Link

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