

Co-design the urban water module in the QUORUM project

Master's Degree Course in Systemic Design "Aurelio Peccei"

Politecnico di Torino

Academic Year 2025-2026

Master's Degree

Systemic Design

Maria Pia Ciccariello



**Politecnico
di Torino**

Supervisor
Prof. Elena Comino
Co-Supervisor
Prof. Christine Mady

Candidate
Maria Pia Ciccariello
S329905

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Index

Introduction

page 8

Chapter 1

Background and topic covered

page 10

Urban Resilience

page 12

Climate change and urban challenges related to water

page 18

Interdisciplinary collaborations for sustainable and transformative solutions

page 26

Chapter 2

Research methodology and approach

page 28

Design Thinking

page 30

System Thinking

page 32

Future Studies

page 34

Eco-design and a systemic approach in urban, educational and sustainable contexts

page 38

Chapter 3

The QUORUM project and the Unite! context

page 42

Unite!'s role and the focus on “Sustainable cities and water”

page 44

What is QUORUM: vision, objectives and structure

page 46

Partner universities and the European framework for collaboration

page 48

Chapter 4

Water resources in an urban environment

page 50

Understanding water in urban environments: functioning, dynamics and criticality

page 52

The role of water in contemporary urbanisation processes

page 54

Case studies and design approaches for sustainable water management

page 58

Chapter 5

Pedagogical approach of the educational module

page 66

Expected Learning Outcomes (ILO)

page 68

Active and collaborative teaching practices

page 72

Education for sustainability and transformative pedagogies

page 76

Chapter 6

Multidisciplinarity and co-design in the QUORUM Project

page 78

The international team's perspectives and disciplinary challenges

page 80

Organisation and collaborative tools adopted

page 83

Collaborative dynamics and transferable skills

page 86

Chapter 7

International Mobility Experience at Aalto University (Finland)

page 88

Urban context linked to the presence of water

page 90

The academic and cultural environment at Aalto University

page 120

Pedagogical approach and organisation of teaching

page 124

Chapter 8

Co-design of the module

page 208

WP1- Exchange knowledge on urban river pedagogies

page 210

WP2 – Co-design the urban rivers module

page 216

The module: Confluences: Interdisciplinary visions for water in cities

page 262

WP3 – Module Communication

page 294

Conclusion

page 296

Bibliography & Sitography

page 298

Abstract

The project was divided into several complementary work packages. An initial phase analysed water in urban environments from different disciplinary perspectives. A second phase focused on co-designing the interdisciplinary teaching module to equip students with methodological tools, collaborative skills, and critical-thinking abilities for complex water-related challenges in contemporary cities. Another work package disseminated the project's activities and results within the UNITE! community. The pilot phase involved 25 students from the partner universities (Aalto University, ULisboa, Politecnico di Torino, UPC and KTH), mainly from architecture, urban planning, and engineering, as well as doctoral-level participants. This experience highlighted the value of interdisciplinarity and multiculturalism, fostering dialogue between different disciplinary approaches, cultural contexts, and design perspectives. Through collaborative activities and participatory learning methods, the students developed a shared understanding of urban water-related issues by creating a shared glossary, conducting holistic analyses of the context, and devising design proposals for more sustainable and resilient future scenarios. The project also led to a teaching framework that can be replicated and adapted to different educational contexts. Based on the results achieved, the working group intends to continue developing it and to promote its dissemination and application in further educational and international contexts.

Introduction

At a time characterised by climate change and increasing pressure on ecosystems, water in urban environments plays a central role as a source of ecosystem services essential to cities. This work explores how to analyse these services through the lens of eco-design and co-design, utilising a multidisciplinary approach as a key design strategy for the sustainability and resilience of urban environments. It is within this context that the European QUORUM project, developed as part of the UNITE! Alliance is situated. The project stems from a collaboration between five European universities: Aalto University, Finland; Politecnico di Torino (PoliTo); Universidade de Lisboa (UL); Universitat Politècnica de Catalunya (UPC); and Kungliga Tekniska Högskolan, Sweden (KTH), with the aim of designing an interdisciplinary educational module capable of providing students with the theoretical, methodological and practical tools to tackle water-related challenges in contemporary cities. The project aims to promote innovative forms of learning that tackle complex problems through co-design in a multidisciplinary and interdisciplinary environment. This thesis forms part of this initiative and documents the development process of the educational module, analysing the organisational, collaborative, and pedagogical aspects that characterised the international team's work, as well as the contributions drawn from eco-design and systemic design. The thesis project combines an analysis of the project team's literature, presents and documents the structure of the project's activities, and explores innovative learning practices focused on sustainability and co-design. The approaches of eco-design and systemic design serve as tools for interpreting the context in question; they clarify the relationships between the urban environment, water resources and educational processes, whilst also providing methodological support for navigating a multidisciplinary and international working environment. The contribution of the ecological perspective within the module is highlighted by understanding the relationships between urban ecosystems and sustainable design, achieved through the development of teaching materials. All the approaches mentioned played a significant role in the research conducted at Aalto University during a thesis mobility period abroad, contributing to the working group's activities and the development of the teaching module through analysis of the relevant educational and urban context. This thesis aims to highlight how interdisciplinary collaboration can inform and contribute to the creation of more resilient cities, by linking three elements: water, the urban environment and culture.

Background and topic covered

Today, the concept of *resilience* is closely linked to that of resources. Existing *resources* can be utilised, provided that new ones are developed to fulfil the same needs or functions over time. In a *resilient city*, appropriate measures must therefore be implemented to ensure the capacity to *adapt and respond* effectively to unexpected disruptions.

Urban Resilience

1.1

During a TEDx talk on Urban Resilience by Michael Berkowitz for PearlStreet, he conducted an experiment in which participants were asked: “How would you remember 2020 in ten years, five years, or even just next year? What would you remember most?” Working from home, pay cuts, homeschooling, protests, hurricanes, and wildfires. In just one month, 2020 felt like a lifetime: a devastating pandemic that fuelled violence and racism. Michael Berkowitz argues that in five or ten years’ time, 2020 may seem less exceptional, and that the only certainty is that the years ahead will bring more disasters, more extreme weather events, and more system failures – and therefore more shocks. Climate change, racism, inequality, and public health – issues that have long been present and continue to be addressed – are deeply interconnected, and, sadly, vulnerable communities are the hardest hit, often leading to increased poverty and fragility. “Let’s stop thinking of these problems as separate phenomena; let’s start seeing them instead as a network of interconnected risks and opportunities,” Berkowitz says, presenting a crucial idea. By linking these problems rather than treating them as isolated issues, we can address them together and more efficiently (Berkowitz, 2020).

In recent decades, the concept of urban resilience has emerged. Its innovative aspect lies in recognising that the risks faced by communities can and must be considered as a whole; in this way, communities can become stronger and more resilient in the face of whatever the future may bring. This is significant for two main reasons. First, as Berkowitz explains, “We are not very good at predicting the next crisis. In the late 1990s, for example, many believed the next major event would be a hurricane hitting New York. Then came September 11, when two planes struck the Twin Towers. In the years that followed, there were the anthrax attacks, a plane crash in Queens, the North-East blackout of 2003, the financial crisis of 2008, and it was not until 2012 that Superstorm Sandy struck.” Conceptually, urban resilience can therefore be defined as the capacity of a city – and of the individuals, communities, institutions, businesses, and systems within it – to survive, adapt, and grow in the face of chronic stresses and acute shocks. It involves assessing and understanding the challenges facing the city and developing solutions that address multiple issues simultaneously in a holistic way (100 Resilient Cities, 2017). A city is, in fact, a system comprising a collection

of architectural and engineering structures, but it is also the community that inhabits it, constantly developing and evolving. It can therefore be understood as a ‘living’ organism in a state of continuous transformation. A resilient city is an urban system that does not merely adapt to climate change but rather actively prepares for it, largely driven by global warming. Climate change makes cities increasingly vulnerable, leading to ever more severe consequences and high costs; however, cities are capable of change and adaptation. Responding at social, economic, and environmental levels through actions that can withstand new pressures over the long term – and, where possible, leverage them – becomes a strategic advantage. Building on the well-established concept of sustainability, these principles must be further developed and refined to achieve resilience (Pinto, 2019).



Figure 1. The city like an organism. (Il Tascabile, 2025)

This concept can be better understood through the analysis of several case studies. For example, in Medellín, Colombia, widespread crime and violence prompted the city to seek innovative solutions. The introduction of a cable car system has produced multiple benefits: reduced traffic congestion, improved connections between low-income neighbourhoods and employment areas in other parts of the city, and increased economic opportunities. This is significant because the city's economic centre is located in the valley, while the poorest communities are located on the surrounding hillsides. The programme has generated further benefits, including improved air quality, reduced carbon emissions, economic growth, and greater social cohesion. It is a clear example of an initiative which, although designed to tackle a specific issue, has produced a wide range of ancillary benefits that reduce urban vulnerability and strengthen resilience.



Figure 2. Metrocable. (WRI Ross Center Prize for Cities, n.d.)

A different but equally significant approach can be found in Vietnam, specifically in Da Nang, where communities vulnerable to typhoons now have access to low-cost loans to make their homes more disaster-resistant, and the city is working to make affordable insurance available so that residents can rebuild after a disaster (Berkowitz, 2020).



Figure 3. Da Nang, Vietnam. (Kirandeep Singh Walia, n.d.)

At the same time, Paris also represents a case of integrating climate and social resilience. In fact, in 2014, the city's focus was primarily on climate-related challenges, including flooding, the urban heat island effect, and air pollution. In 2015, however, Paris also faced two terrorist attacks and a refugee crisis. This created the need to address immigration, refugee reception, and radicalisation, while continuing to tackle environmental issues. To do

so, the city identified the need for adaptable public space. In 2017, the City of Paris redesigned three school playgrounds in low-income neighbourhoods with high immigrant populations, using wood and permeable surfaces, and opened them to the community during weekends. These simple interventions reduced urban heat, improved rainwater management, created inclusive meeting spaces, and supported the integration of new residents.

Urban resilience can also be achieved through bottom-up activities, as demonstrated by the nonprofit organisation Re-Powering London. Re-Powering London supports residents of social housing in installing solar panels. The organisation identified underused land near railway stations and collaborated with Transport for London to transform these areas into "bioenergetic landscapes." These spaces generate renewable energy and income, while also improving mental well-being, strengthening social cohesion, supporting biodiversity, and even enabling local food production.



Figure 4. Community-owned solar energy project in London. (Repowering London, 2018)

These case studies naturally raise a key question: how can communities make sense of major events while simultaneously preparing to deal with them? The answer that emerges from this analysis is the need to build strength across all urban systems. This includes meeting the basic needs of the most vulnerable populations; fostering effective governance with inclusive decision-making processes involving key stakeholders; promoting diversified and equitable economies; and supporting cohesive communities in which neighbours look after one another – all underpinned by sustainable and multifunctional infrastructure. Together, these capacities enable cities not only to respond to and recover from shocks but also to adapt and thrive in the face of risk and adversity (100 Resilient Cities, 2017; Berkowitz, 2020). To provide some context, it is estimated that by 2050, approximately 70% of the world's population will live in urban areas. Resilient thinking is therefore essential in preparing cities for this future. In response, dozens of cities worldwide have appointed Chief Resilience Officers and are developing resilience strategies to address both known and unforeseen challenges (100 Resilient Cities, 2017). The concluding message of Berkowitz's talk is straightforward: take small steps, but act now. Practical examples include joining local organisations, reclaiming neglected spaces, or simply getting to know one's neighbours. Even these seemingly modest actions can contribute to

making cities and communities more resilient over time. It is at the community level – through collaboration with local leaders – that vulnerabilities can be fully understood and meaningful resilience built (Berkowitz, 2020). In addition, various knowledge-sharing platforms facilitate the exchange of information and best practices. In the field of urban planning, these platforms represent valuable, continuously evolving databases for understanding challenges and the strategies implemented to address them. For example, within the 100 Resilient Cities programme, resilience is understood not only in relation to acute shocks – such as earthquakes, fires, or environmental disasters – but also in terms of chronic stresses, including unemployment, inefficient transport systems, and shortages of food and water. These are primarily social challenges, closely tied to people and place. The programme aims to work directly with institutions, supporting public authorities and policy-makers in improving urban conditions (100 Resilient Cities, 2017).



Figure 5. Urban Resilience Initiative. (Resilient Cities Network, 2026)

At a broader scale, Climate-ADAPT – an initiative established by the European Commission and managed by the European Environment Agency – provides access to extensive data and information on climate change risks, EU sectoral policies, adaptation strategies, national initiatives, and decision-support tools. Today, the concept of resilience is closely lin-

ked to that of resources. Existing resources can be utilised, provided that new ones are developed to fulfil the same needs or functions over time. In a resilient city, appropriate measures must therefore be implemented to ensure the capacity to adapt and respond effectively to unexpected disruptions (Pinto, 2019).



Figure 6. Club di Roma-MIT: "The Limits to Growth" turns 50. (Nespor Stefano, 2026)

Climate change and urban challenges related to water1.2

Given the points discussed above, it is essential to further explore the role of climate change in shaping contemporary urban dynamics. In line with a large body of literature, mitigation and adaptation measures should be integrated into planning and design processes in order to support the sustainable transformation of cities. As the impacts of climate change become increasingly evident – and are expected to intensify in the coming years – acting to limit their effects is no longer optional; it is necessary. To better understand these impacts, it is useful to first clarify two key concepts: climate and the climatological system. Climate refers to the average state of climatic conditions influenced by temperature, precipitation, wind, humidity and solar radiation. On the other hand, the climate system is composed of interconnected subsystems that regulate the climate through continuous exchanges of energy and matter. Analysing these interplays provides a deeper understanding of climate change, defined as changes in Earth's climate

across various spatial and temporal scales. This understanding is supported by increasingly advanced observations and climate models, which allow reliable projections of future scenarios. Among the various forms of anthropogenic climate change, the one with the greatest impact is the rise in global temperatures, mainly caused by greenhouse gas emissions and deforestation. Rising temperatures trigger a series of knock-on effects, including the melting of polar ice caps, rising sea levels, and increased heat absorption by the oceans, which, in turn, deepen climate change. Current observations confirm that global warming is already underway: the global average temperature has increased by approximately 0.85 °C. At the same time, precipitation patterns are shifting, with more frequent extreme weather events and heatwaves, alongside fewer cold days. Because climate change operates on a global scale, effective responses must also be coordinated globally in order to reduce risks and ensure livable conditions (Pinto, 2019).

As a result, climate-related disasters – particularly those linked to water – are becoming more frequent, making urban resilience an increasingly central concern in how cities respond to these challenges (Pinto, 2019).

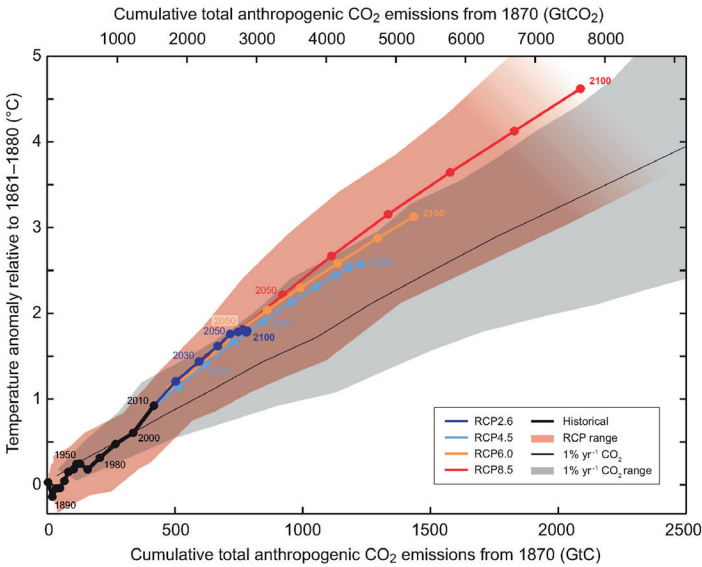


Figure 7. Elements for a National Strategy for Climate Change Adaptation. (Castellari Sergio et al, 2014)

Within this context, water emerges as a key lens through which these issues can be interpreted. A closer look at water-related challenges – such as floods, droughts, rising sea levels, environmental degradation, heatwaves, coastal erosion, soil degradation, pollution, and wastewater – reveals a series of interconnected impacts. These include increased rainfall intensity combined with fewer rainy days, reduced summer precipitation, growing social pressure over water use, increased surface runoff from soil sealing, alterations in river regimes, and heightened risks of flooding and sea-level rise. Given these pressures, existing urban water systems often reveal significant limitations. However, their design also offers an opportunity to address many of the recurring challenges cities face. The concept of the water-smart

city is based on a holistic approach to managing the entire water cycle, aiming to ensure a reliable water supply while simultaneously reducing the risk of environmental disasters. From this perspective, cities are understood as complex systems in which individuals and societies interact with both natural and built environments, requiring social, economic, environmental, and engineering dimensions to be considered in an integrated way (Nardi, 2021). Through real-life examples, it becomes possible to observe how environmental disaster risk management is implemented in practice, bringing not only the strategies adopted, but also the obstacles and the results achieved into focus. Case studies in this way help to ground the discussion and make the previously outlined dynamics more palpable and easier to interpret.



Figure 8. Water Infrastructure Is Key to the Development of Smart Cities. (Smart Water Magazine, 2020)

A first example is Bilbao, where a public-private partnership has been established to transform the former industrial district of Zorrotzaurre. Located on a peninsula in the River Nerbioi, the area is particularly exposed to flooding due to the risk of the river overflowing. In response to both the increasing frequency of extreme rainfall events in the Basque region and the growing demand for housing, local authorities have promoted a comprehensive urban regeneration plan. The project is managed through a partnership involving public and private actors, including landowners, who contribute in proportion to their ownership share. Rather than relying on a single intervention, the strategy combines multiple, integrated measures. The opening of the Deusto canal, for instance, will convert the peninsula into a true island while improving water flow and reducing flood risk. At the same time, flood barriers are being constructed along the river banks, and the ground level for new developments is being raised by approximately 1.5 metres. These structural interventions are complemented by the installation of rainwater storage systems and the creation of extensive permeable green areas, which help absorb water and reduce surface runoff (Legambiente, 2022).



Figure 9. Bilbao – Neighbourhood Zorrotzaurre. (Legambiente, 2022)

A different but equally significant approach can be observed in Rotterdam, a city where water has historically been a major threat. Located in the delta of the Nieuwe Maas River, with around 80% of its territory below sea level, Rotterdam has progressively recast its relationship with water, transforming vulnerability into a chance for innovation. This shift began in 2007 with the launch of the Rotterdam Climate Initiative, a collaboration between the municipality, the port authority, private companies and ecological agencies aimed at reducing CO2 emissions while strengthening climate resilience. Based on this foundation, the city introduced the programme “Rotterdam Climate Proof” in 2008, which set out a wider vision: to position Rotterdam as a leading international hub for knowledge on water and climate change, to improve its attractiveness for residents and businesses and to foster the development of cutting-edge solutions with export potential. Within this system, the city has embraced the concept of the “sponge city”, learning to accommodate and manage water rather than simply resist it.

This approach is reflected in a range of concrete interventions. Existing underground infrastructures have been repurposed to store rainwater, with former car parks converted into large-capacity reservoirs. For example, the Kruisplein site can store up to 2,300 cubic metres of water, while the Museumpark, operational since 2011, can hold up to 10,000 cubic metres. At the urban surface level, multifunctional public spaces known as “watersquares” have been introduced. Projects such as Benthemplein (2013, winner of the C40 Cities Award), Bellamyplein (2012), and Kleinpolderplein (2011) combine social and environmental functions, serving as public squares under normal conditions and as water retention basins during heavy rainfall. Designed by the Rotterdam-based firm De Urba-

nisten, these spaces are part of a broader water management system composed of interconnected basins and channels. By collecting, storing, and gradually reusing rainwater – for example, for irrigating nearby green areas – they help mitigate surface runoff and prevent sewer systems from being overloaded, thereby reducing the discharge of untreated water into the sea. For most of the year, however, these spaces remain fully accessible as dry and usable urban environments. Looking more closely at the technical aspects of the project, the water system is organised around three basins designed to collect rainwater, including runoff from the surrounding buildings. Among them, the deepest basin functions as a reservoir during the most intense rainfall events. Water is conveyed into the system through stainless steel channels that, when dry, double as informal recreational elements – for instance, skateboarders can use them. After rainfall, the water retained in the two shallower basins is gradually directed into an underground collection system, from which it infiltrates the groundwater.

This process not only supports the natural recharge of soil but also helps the urban environment cope with drought, promoting vegetation growth and mitigating the urban heat island effect. Meanwhile, the water stored in the deepest basin is transferred to the city's water supply system within thirty-six hours, preventing stagnation and overloads in the sewer network.

Beyond its environmental performance, the project has also contributed to the economic revitalisation of the neighbourhood, which had experienced years of decline. Today, the area has become a hub for start-ups, young professionals, creatives and local associations, all actively engaged in rethinking their urban environment and testing new development models (Legambiente, 2022).



Figure 10. Rotterdam – The Flood Prevention Plan. (Legambiente, 2022)

A further and final example can be observed in Glasgow, where a catchment-based approach has been adopted to address the risk of flash floods. Awareness of this issue began to grow between the 1980s and 1990s, when projections linked to climate change indicated an increase in rainfall event intensity. In response, the City Council prioritised developing a structured flood prevention strategy. Particular attention was given to the White Cart Water, a relatively shallow river prone to sudden and extreme rises in water level – up to six metres within just twelve hours of rainfall – resulting in frequent flooding of downstream urban areas. To mitigate this risk, a major intervention was implemented in 2006, involving the construction of three upstream storage areas designed to intercept excess water during heavy rainfall. By regulating flow before it reaches the urban core, these infrastructures significantly reduce the likelihood of the river overflowing. The system is complemented by additional barriers and

containment measures, forming an integrated approach to address both current vulnerabilities and future risks associated with climate change. However, the issues highlighted by these case studies cannot be attributed solely to climate change. They are also the result of more extensive, interconnected dynamics that characterise what is often called the Anthropocene, a period defined by rapid, large-scale transformations driven by human activity. Factors including population growth, economic expansion, increasing water demand, food production, technological development, pollution and the intensive use of natural resources contribute to increasing conditions of risk and instability. In this context, water resources are under growing pressure. This is not simply a matter of population size, but rather of consumption patterns and the imbalance between actual needs and usage.

According to a study conducted by the University of Twente in Enschede, the average water footprint per person is approximately **1,385 m³** per year, with significant variations between countries — for example, **2,842 m³** in the United States compared to **1,071 m³** in China. Agriculture further exacerbates this pressure, as water is extensively used not only for irrigation and processing but also for overall food production. At the same time, inefficiencies within the system lead to substantial losses: each year, nearly **250 km³** of water is effectively wasted due to food loss and waste, corresponding to around **1.3 billion** tarded food loss. On a global scale, thisoximately **13.4%** of cereals and **21.7%** of meat products (Pinto, 2019). Urban systems themselves play an important role in shaping water availability. While climate change certainly affects water supply, many of the most critical issues originate in cities. The increasing demand for water alters its access, distribution and quality, generating rivalry over resources and triggering a series of interconnected effects, including soil sealing, reduced groundwater recharge, excessive water extraction, and increased soil instability. Flooding, in particular, is a widespread and recurring issue. Although it may be influenced by climatic and geographical conditions, it is largely determined by urban planning choices. At the same time, ecosystems are often the first to be affected by these transformations — an aspect that will be explored in greater detail later in this thesis. In light of these challenges, there is an urgent need to invest in disaster risk reduction, not only to minimise human life loss but also to limit environmental and economic damage. Within this framework, awareness becomes a crucial factor: only a broad, informed understanding of risks and their dynamics can support the adoption of effective, sustainable strategies. It is precisely within this perspective that the present thesis is positioned, aiming to provide tools for interpreting and addressing issues related to urban water systems, and ultimately contributing to the development of a more conscious and responsible risk culture (Nardi, 2021).



Figure 11. A Flooded Street in Houston, Texas with Palm Trees and a Building Nearby. (Rodriguez Emmanuel, n.d.)

Interdisciplinary collaborations for sustainable and transformative solutions

1.3

We are facing an increasingly uncertain world in which climate change is fundamentally reshaping cities across the globe. This condition calls for action, particularly through bottom-up approaches, including the development of university systems capable of renewing both teaching and research models. Within this context, education assumes a central role. It is precisely within the academic environment – characterised by interdisciplinarity and multiculturalism – that the awareness needed to address the complexity of climate change can be developed through holistic and integrated perspectives. For this reason, the present work is directed towards future graduates, understood as key agents of change. To effectively engage with challenges such as those posed by the European Green Deal and the United Nations Sustainable Development Goals, students must be equipped with new educational approaches that foster both interdisciplinary competencies and multicultural experiences (UNITE!, 2024). Interdisciplinary education, however, does not simply mean combining different fields of knowledge; it requires the development of broad, integrated skills that can be shared across disciplines and cultural contexts. As a

result, evaluating learning outcomes becomes more complex and highly context-dependent. Within the framework of this thesis' project – focused on the multifaceted issues related to water in the urban environment – the working hypothesis is that such an approach can enhance the ability to both understand and address water-related challenges under conditions of climate change and uncertainty. As an initial operational step of the QUORUM project, the following were shared a common interdisciplinary language, allowing clearer definitions of urban watercourses and fostering alignment among the different fields involved. Initial activities such as open presentations and discussions were fundamental in identifying the cross-cutting dimensions of the topic. Building on this shared foundation, the analysis of case studies was then structured around a set of key themes that helped organise and interpret emerging knowledge: interdisciplinarity, multiculturalism and joint effort. Within this system, interdisciplinarity brought together a wide range of fields, including lighting design, environmental engineering, ecology, urban studies, pedagogy, and participatory design, alongside contributions from geography, history, mathematics, phy-

sics, and computer science. This plurality of perspectives allowed approaching the same subject from different angles, broadening the overall understanding. At the same time, multiculturalism was supported by drawing as a shared language, the formation of diverse working groups and the promotion of dialogue, motivation and well-being. In turn, collaboration appeared as a key dimension for addressing themes that span both disciplinary boundaries and geographical contexts. In parallel, a series of teaching practices were identified as particularly effective, whether applied individually or in combination. Rather than functioning as isolated methods, these approaches – such as learning by doing, project-based learning, problem-solving, experiential learning, collaborative learning, inquiry-based learning, and critical thinking – contribute to a more dynamic and engaged learning process. This phase was accompanied by a systematic effort to identify and compare key terms used across different disciplines, subsequently reorganising them in relation to urban rivers, their components, processes, challenges, and opportunities. This preliminary work ultimately led to the definition of a structured interdisciplinary

and multicultural learning process, grounded in both pedagogical and disciplinary literature. The process unfolds through a series of interconnected phases – understanding the problem and its context, designing solutions, testing and evaluating outcomes, and iterating the results – which will be explored in greater depth in the chapter dedicated to Design Thinking, given their strong interrelation (QUORUM, UNITE!, 2026, Appendix 1).

Research methodology and approach

The first chapter outlined the theoretical and contextual framework, highlighting the growing importance of *urban resilience* in relation to climate change, particularly water-related challenges. In light of these considerations, it is now necessary to set out the *methodological* approach adopted in order to understand how these issues are translated into operational *tools* and research processes.

Design Thinking

2.1

The following chapter introduces the methodologies directing the development of this thesis' project. In particular it will explore approaches such as Design Thinking and System Thinking, which are considered complementary tools for addressing the complexity of environmental phenomena. These are supported by the study of Future Studies, not only as a field of inquiry, but also as a pedagogical practice designed to train future professionals who are aware and capable of operating in uncertain contexts. Enriched by the introduction of a systemic approach and eco-design, the methodological framework is applied to urban, educational and sustainable contexts, with the aim of integrating environmental, social and design dimensions into a unified vision. Design thinking, developed by Stanford University, is a human-centred approach to design that aims to solve complex problems through innovative, sustainable and meaningful solutions for people.

This process is not linear but iterative, encouraging continuous learning through observation, experimentation and direct engagement with users. The model is divided into five key phases: empathise, define, ideate, prototype and test; these guide the designer towards understanding people's needs through to the creation and validation of the solution. The methodology encourages multidisciplinary collaboration and creativity, transforming people's needs into starting points for innovation. This model was used during the first phase of the thesis project, in which interdisciplinary and multicultural pedagogical concepts were explored and subsequently applied in practical co-design activities, through worksheets, group work and plenary discussions, directly involving teachers and students in collaborative exercises and immersive experiences on the river. These practices will be explored in greater depth in Chapter Eight.

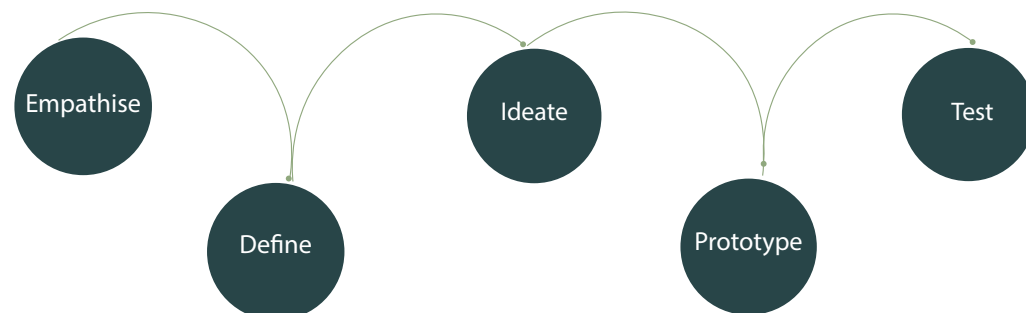


Figure 12. Design Thinking Process Steps. (IDEO and Stanford d.school, n.d.)

Empathising: This approach enables us to understand people within the context of the design challenge; it becomes clear how they think and act, their physical and emotional needs, and what is important to them. To empathise, we follow five simple steps: we observe users and their behaviour within the context of their lives; engage users through a simple conversation, using a few questions as a guide but without steering the conversation; encourage the stories they tell and ask why; observe, listen and invite them to physically demonstrate the steps and explain why they do what they do; request them to verbalise what is on their minds; and finally, use the environment to prompt deeper questions. We then proceed to a summary of the gathered information to link similar concepts and draw further connections, impressions, and insights about the target user.

Define: This stage in the design process involves narrowing the design's scope, thereby defining the challenge at hand based on what has been learned about the user and the context. It is, therefore, a guiding statement that focuses on a particular user's insights and needs. These insights very often emerge from a process of synthesising information. To complete this step, it is important to note something interesting: why a specific behaviour occurs is examined, an understanding of the type of person for whom the design is intended is established, and a limited set of needs is selected to work with, in the aim of expressing the insights that are emerging through the synthesis of information gathered, thanks in part to the research work.

Ideation: the phase of the design process that focuses on generating concepts. It provides an opportunity to combine an understanding of the problem and the people we are designing for, using imagination to develop potential solutions. Particularly in the initial phase, a range of ideas can be

put forward, from which a selection is then made to identify the best one. This is done to move beyond the most obvious solutions, gain insight into other team members' perspectives, and uncover unexpected areas for exploration.

The transition from generating ideas to evaluating them is a time when imagination and creativity are given free rein. To ensure that none of the innovative possibilities identified through team brainstorming is wasted, three voting criteria can be established to select the most suitable solution. These might include the most likely option, the most rational choice, or the most unexpected idea. The two or three ideas that receive the most votes are then taken forward to the prototyping phase.

Prototyping: this is where artefacts are generated iteratively to answer questions that bring us closer to the final solution. In these early stages, low-fidelity prototypes must be created that are cost-effective and can elicit immediate feedback from colleagues. In subsequent stages, these prototypes are then refined.

There is no need to spend too much time on this, and it is not advisable to become emotionally attached to a single prototype. When there are multiple variables, it is important to identify each prototype and what it responds to when tested. It is essential to continue building, keeping the user's perspective in mind. What do we hope to have the user test? What kind of behaviour do we expect?

Testing: The testing phase is when we seek feedback from users on the prototypes. This gives us the opportunity to gain a deeper understanding of our users, but unlike the first step—when we empathise—the problem is now much better defined. Ideally, testing should take place in a real-life context for the user; if we're talking about a physical object, we can ask people to take it with them and use it in their everyday environment, or create a situation that is as realistic as possible (Pacheco, 2025).

System Thinking

2.2

To continue the design approach introduced through Design Thinking, it is necessary to broaden our perspective and focus on a more systemic dimension, one capable of capturing the relationships between the various elements that make up the subject under analysis. Nowadays, it is increasingly unthinkable to observe a phenomenon without considering its impact beyond its immediate scope. The change we are currently experiencing is a shift in how we observe reality (Carrillo, 2020). Systemic thinking, or System Thinking, in its contemporary linguistic application, fits precisely into this framework. System Thinking explores how and why things happen, investigating the internal logic of systems and, in particular, understanding the connections and causes underlying phenomena. It tends to focus on observing recent events and visible symptoms; it analyses what happens over time, trends and recurring patterns; it asks questions about what causes these patterns: the lack of rules, policies, and economic flows; finally, it analyses the beliefs and values that maintain the system as we see it (Tahtinen, 2025). In recent decades, the increasing complexity, interrelation, and interdependence of sy-

stems have radically shifted the perspective from a linear cause-and-effect view to an organic, holistic approach. Linearity is not sufficient to understand complex phenomena; the characteristic properties of a systemic unit must be explained in terms of the properties and interactions of its components. Systemic thinking, however, has much older roots; between 1950 and 1980, general systems theory, cybernetics and systems dynamics emerged, leading to the definition of a system as “A set of interconnected elements that is organised coherently in such a way as to achieve a purpose”, according to the definition by Donella Meadows, scientist, humanist and writer. Meadow was also the lead author of *The Limits to Growth* (1972), a report commissioned by MIT and the Club of Rome, based on the World3 computer simulation. Using a systemic approach (involving non-linear equations and feedback loops), it describes a range of possible scenarios regarding the impact of continued population growth and industrial production on the Earth’s ecosystem (whose resources are not infinite). An often-criticised approach at the time has, however, been vindicated today, as it predi-

cted a scenario very similar to the current one, which, without a sustainable revolution, will lead to uncontrolled decline and, according to some scenarios presented, could lead to the collapse of planet Earth. The future cannot be predicted, but it can be imagined, envisaged and designed. We cannot anticipate the world with certainty, nor can we impose our will upon it; what we can do is listen to what it has to say and discover how we can design with certain characteristics in mind. We can create something better than what we could achieve through our own will alone, and perhaps even something more in harmony and ‘balance’ with other systems, especially natural ones (Capra & Luisi, 2014). It differs substantially from Design Thinking, which focuses on understanding the human experience. In System Thinking, leverage points for action are identified by first understanding the problem’s structure.

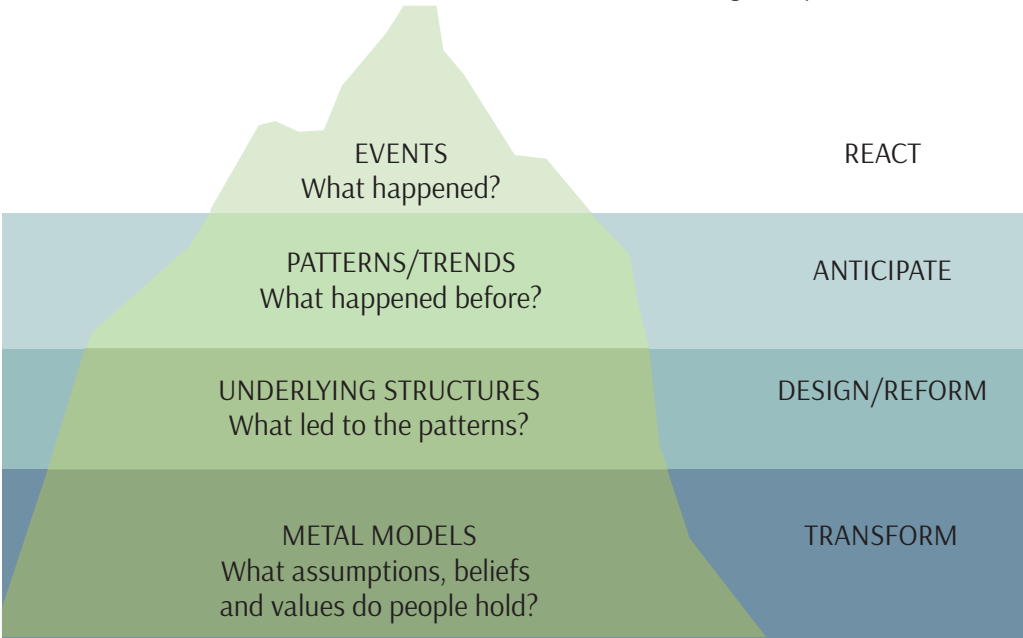


Figure 13. Systems Thinking Model. (Goodman Michael, 2002)

Future Studies

2.3

Within the methodological framework, Design Thinking enables us to translate people's needs into design solutions through collaborative processes, whilst System Thinking allows us to understand the interconnections that govern complex phenomena. The field of Future Studies provides a further dimension comprising: anticipation, imagination and the design of alternative scenarios. This approach, presented by Professor Lassi Tähtinen at the

Aalto University within the context of the built environment, serves as an extension intended to enrich analytical methods. It offers a perspective for addressing studies related to environmental issues and contexts characterised by uncertainty, promoting a forward-looking view of the phenomena observed. Thinking about the future is natural for all human communities and, furthermore, is a generic term referring to the following overlapping concepts:

Future literacy: “The ability to consider the potential of the present to shape the future by developing and interpreting narratives about possible, probable and desirable futures” (Miller, 2007).

Future awareness: “The human capacity to understand, anticipate, prepare for and embrace the future” (Ahvenharju, 2021).

Future orientation: “The characteristic and capacity, unique to human beings, that enables them to change their thinking in relation to the past and present, but also to continually reflect on assumptions and expectations regarding the future” (Miles, 1994).

A systematic, holistic, multidisciplinary, critical, and long-term study is being carried out, alongside the anticipation of alternative development trajectories, based on an understanding of and information from the present and the past. The future is always uncertain; information is incomplete, and therefore, it is not possible to predict a detailed future or identify all possible futures. Often, a holistic, multidisciplinary synthesis of complex issues is prepared. The field of Future Studies is based on the idea that the future is not fixed or predetermined, but open and malleable. For this reason, the goal is not to predict a single future scenario, but rather to explore and understand multiple possible alternatives. Within this field, three main approaches are distinguished: anticipation, foresight and forecasting/prediction. Anticipation is an emerging approach rooted in philosophy, psychology, and systems thinking that focuses on the use of anticipatory processes in the present, with an emphasis on the concepts of the future, emergence, and future literacy. Foresight is a more action-oriented and participatory approach, used primarily for stra-

tegic analysis and decision support within organisations, with a generally shorter time horizon than studies of the future. Finally, forecasting or prediction is based on the analysis of existing data and trends to project them into the future using statistical models, time series and other quantitative tools. It is therefore clear that the study of the future is not limited to prediction alone, but encompasses various levels of analysis ranging from qualitative and strategic interpretation to the quantitative modelling of trends.

The discipline of Future Studies encompasses an interdisciplinary field of research situated at the intersection of the social, natural and human sciences. This field of study is influenced by humanities such as sociology, anthropology, history and philosophy, from which it draws its ability to understand human behaviour, cultural systems and transformations over time. Similarly, it integrates technical contributions from statistics, economics, and political science, enabling the creation of trend-based models, the assessment of impacts, and the construction of scenarios based on data and empirical analysis.

However, it should be noted that Future Studies are not merely a point of convergence between disciplines: they, in turn, exert an influence on them. They stimulate innovative approaches and foster a systemic, medium to long-term vision, which is essential in a global context characterised by complexity, uncertainty and change.

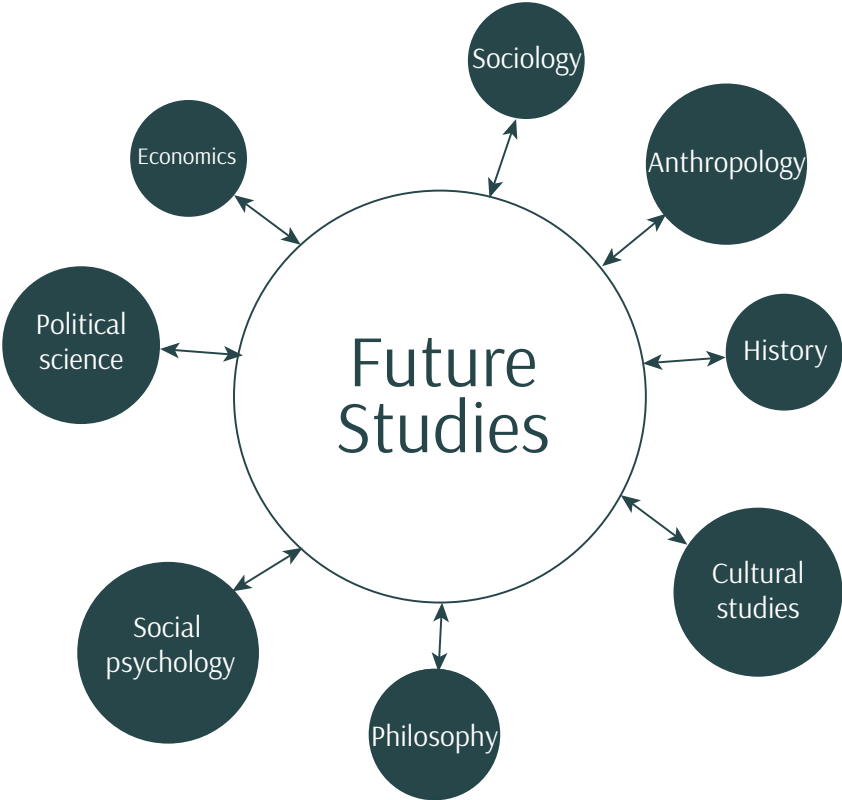


Figure 14. Futures Studies as a Discipline. (Tahtinen Lassi, 2025)

One way to manage this field is to analyse phenomena using the VUCA model, an acronym that describes four fundamental characteristics of actual phenomena: V for volatility, meaning rapid and unpredictable changes; U for uncertainty, referring to the difficulty when predicting future developments; C for complexity, linked to the presence of multiple linked factors; A for ambiguity, which concerns the lack of clarity in interpreting events and data. Employing this framework means questioning the nature of the phenomenon at hand: whether the situation is unstable, whether the available information is sufficient, whether the variables involved are numerous and interdependent, or whether the context is unclear and open to different interpretations. The VUCA model enables us to conduct an in-depth, targeted

analysis, leading to more informed, focused strategies. In this process, it is useful to refer to the six pillars that guide the practical application of the discipline. We begin by mapping the present and possible futures to gain a clear picture of the current context and its developments. This is complemented by the ability to anticipate the future, spotting weak signals and emerging trends. Another element is the timing of the future, i.e. understanding when certain changes may occur. Deepening the future, analysing its deeper and systemic implications. Alongside this, it is necessary to create alternative scenarios from the present, developing different and plausible scenarios. Finally, transforming the present to build the future, translating analyses into concrete actions geared towards the desired change (Tahtinen, 2025).

Eco-design and a systemic approach in urban, educational and sustainable contexts 2.4

Having introduced tools designed to understand needs, identify interconnections and develop future scenarios, the methodology takes shape and becomes established within a research framework that enables these perspectives to be integrated into design practices focused on sustainability. In this regard, Eco-design acts as a design approach which integrates environmental requirements into development processes, intending to reduce impacts throughout the life cycle of products, services and systems. Eco-design has the potential to reduce greenhouse gas emissions, thereby slowing climate change, and to achieve many of the 17 Sustainable Development Goals set out by the United Nations.

As highlighted in the literature, eco-design cannot be considered in isolation. Sustainability is, in fact, a systemic property that encompasses interdependent environmental, social, and economic dimensions and therefore requires a holistic, integrated approach. Eco-design is evolving towards models increasingly oriented towards collaboration, the circular economy, and the integration of design with sustainable business models, emphasising the importance of considering not only technical aspects but also cultural, social, and educational ones. Indeed,

terms related to Eco-design include concepts such as design for the environment, eco-sustainable design, ecological design and sustainable innovation. Several studies recognise that Eco-design can benefit from an exchange of ideas; in this sense, sustainability education is a central element, as it promotes interdisciplinary and action-oriented pedagogical approaches. This enables the development of the knowledge, skills, values and general competencies needed to address complex socio-ecological issues. (Schäfer et al., 2020). "Sustainability Education does not represent a preconceived notion of sustainability, nor does it define what the educational pathway towards achieving it should be. Rather, it opens up possibilities for critical discussion and suggests a constantly evolving process" (Corres et al., 2020). At the same time, systems thinking enables us to broaden our field of observation, moving beyond a sectoral view to encompass the relationships between different actors, processes and scales (from the micro to the macro level). From this perspective, the urban environment becomes a complex system in which environmental dynamics and social and economic transformations are intertwined; at the same time, the educational context plays a key role in fostering the skills needed to address this complexity (Schäfer et al., 2020).

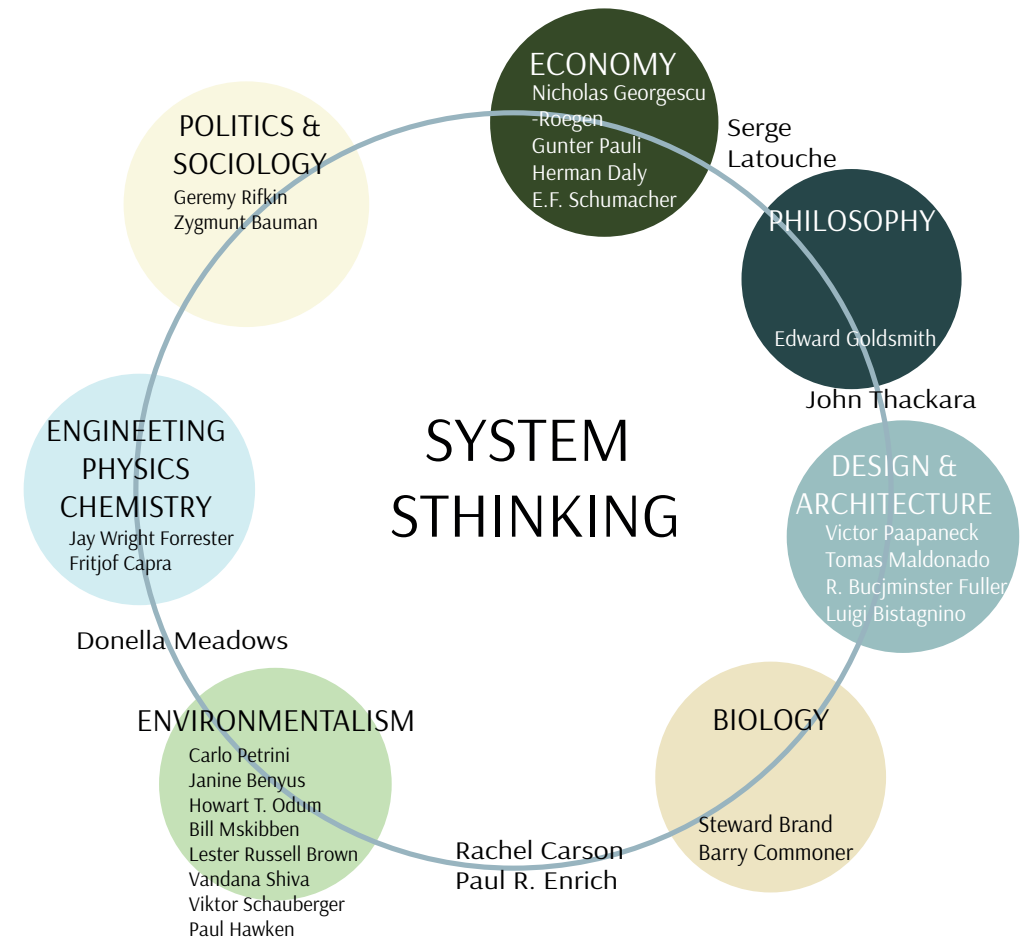


Figure 15. Systems Thinking. (Peruccio Pier Paolo, 2025)

In this context, the systemic approach is not limited to an analytical interpretation of complexity, but rather constitutes a genuine design methodology grounded in a number of key principles. Primarily, the central role of relationships is recognised: it is the connections between elements that generate the system itself, according to a logic in which the whole is greater than the sum of its parts. This is combined with the principle that the outputs of one process can become the inputs of another, giving rise to continuous flows of matter, energy and information, echoing the principles of the circular economy. A further aspect concerns the autopoietic dimension of systems, understood as entities capable of sustaining and regenerating themselves through the production of their own components, evolving in relation to other systems with which they come into contact. Simultaneously, attention to the local context takes on a priority role: designing in a systemic manner means making the most of a territory's specific resources, whether material, social, cultural or economic.

The final pillar describes how the systemic approach is intertwined with human-centred

design, in which complex problems are interpreted through the lens of communities and individuals, who are regarded as active participants in a wider ecosystem. These six pillars thus become fundamental elements in developing design practices capable of addressing sustainability challenges (Barbero et al., 2025). Within the framework of Education for Sustainability, as mentioned above, collaboration is fundamental to achieving sustainability goals. Synergies, a shared perspective, the exchange of knowledge and experience, a more holistic approach, and greater effectiveness of the methods developed are cited as benefits of collaboration between researchers (Schäfer et al., 2020). Specifically, Systemic Designers act as mediators, promoting horizontal dialogue among the actors and disciplines involved, leveraging their interdisciplinary skills to help build a shared vision (Barbero et al., 2025). Eco-design and the systemic approach are therefore not merely understood as a set of tools and methodologies, but as fields of interdisciplinary research situated at the intersection of design, sustainability and education, enabling us to navigate contemporary urban contexts by highlighting their potential and/or critical issues.

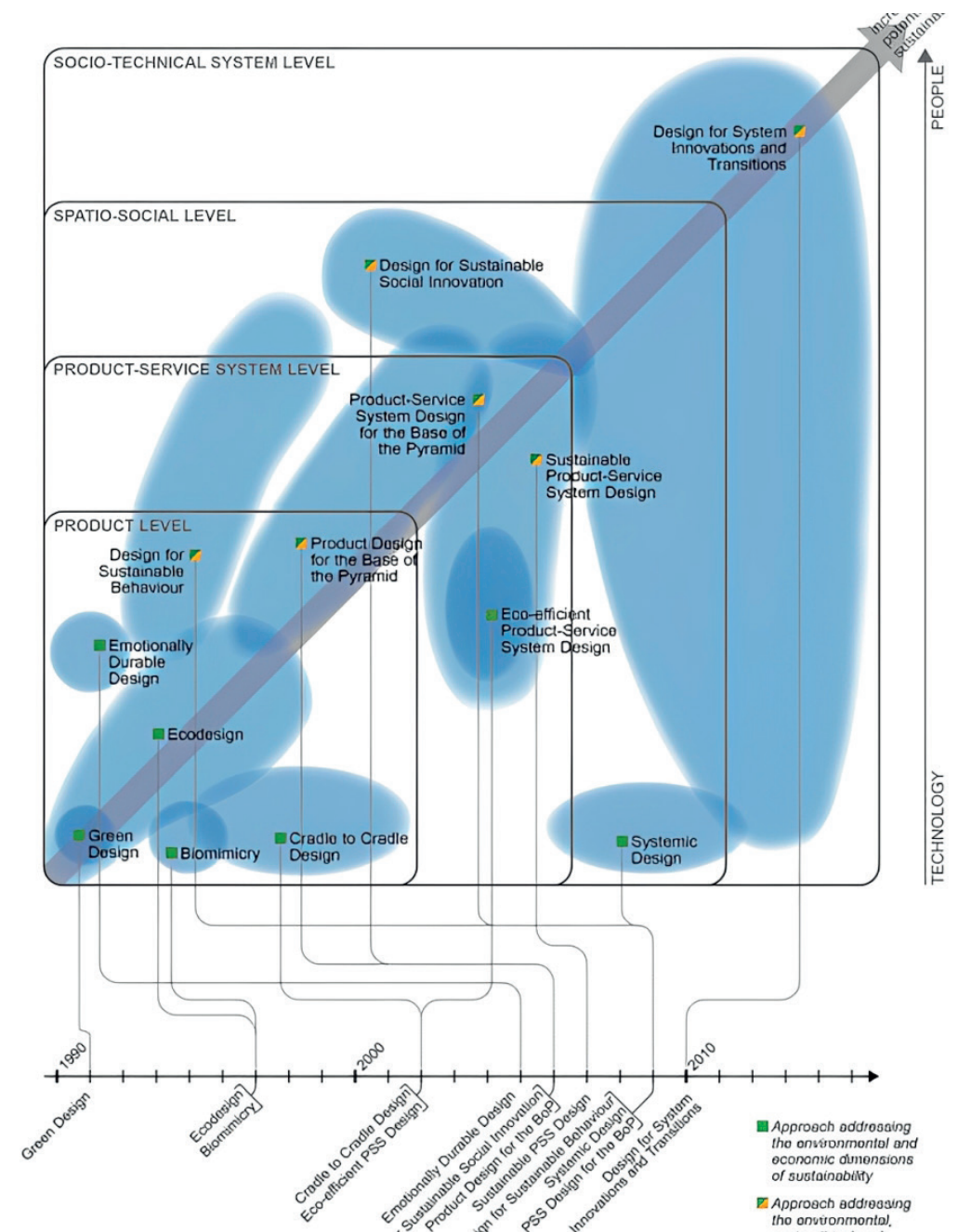


Figure 16. Evolution of design for sustainability: From product design to design for system innovations and transitions. (Ceschin, F., & Gaziulusoy, I., 2016)

The QUORUM project and the Unite! context

Having outlined the *methodological* framework in Chapter 2, the following sets out the *practical context* in which these approaches are implemented.

First and foremost, the project is situated within the *European alliance Unite!*.

Unite!'s role and the focus on “Sustainable cities and water”

3.1

Unite! is an alliance of nine European universities, including: Technical University of Darmstadt (TUDa), Aalto University (Aalto), Graz University of Technology (TU Graz), Grenoble INP Graduate School of Engineering and Management, University of Grenoble Alpes (Grenoble INP-UGA), KTH Royal Institute of Technology (KTH), Politecnico di Torino (PoliTO), University of Lisbon (ULisboa), Universitat Politècnica de Catalunya · Barcelona Tech (UPC) and Wrocław University of Science and Technology (Wrocław Tech). These institutions share a common vision: to promote innovation, sustainability and international collaboration in research, technology and education. In doing so, they form a network of connections that enables students, staff and professionals to drive change and tackle global challenges. A dynamic platform that fosters interdisciplinary exchange, inclusivity and academic excellence.

Unite! focuses on several thematic areas that drive research and innovation. These areas include digital transformation, health and wellbeing, the energy transition, biotechnology, and sustainable development, with a particular

focus on sustainable cities and water, which is the subject of this project (UNITE!, n.d.).

The QUORUM project fits within this framework through the Unite! call for proposals. Seed Fund for Teaching and Learning, Unite! funded the project in partnership with Aalto University (Manoso, 2025). The aim was to support the development of joint or collaborative teaching formats within the areas of interest of the Unite! university alliance. The universities involved in the QUORUM project were: Aalto University, the Politecnico di Torino, the University of Lisbon, the Polytechnic University of Catalonia · BarcelonaTech and KTH Royal Institute of Technology.

The modules developed using this method enable students to study at one or more universities within the Unite! network for a period of time, thereby promoting sustainable student mobility. Unlike longer exchanges, these shorter courses – because they are more accessible to a wider range of students – have been designed to encourage greater participation. The Unite! funds have enabled the interdisciplinary team to explore innovative learning approaches to develop resilient water-related solutions in uncertain urban contexts (UNITE!, 2024).

As a result, climate-related disasters – particularly those linked to water – are becoming more frequent, making urban resilience an increasingly central concern in how cities respond to these challenges (Pinto, 2019).

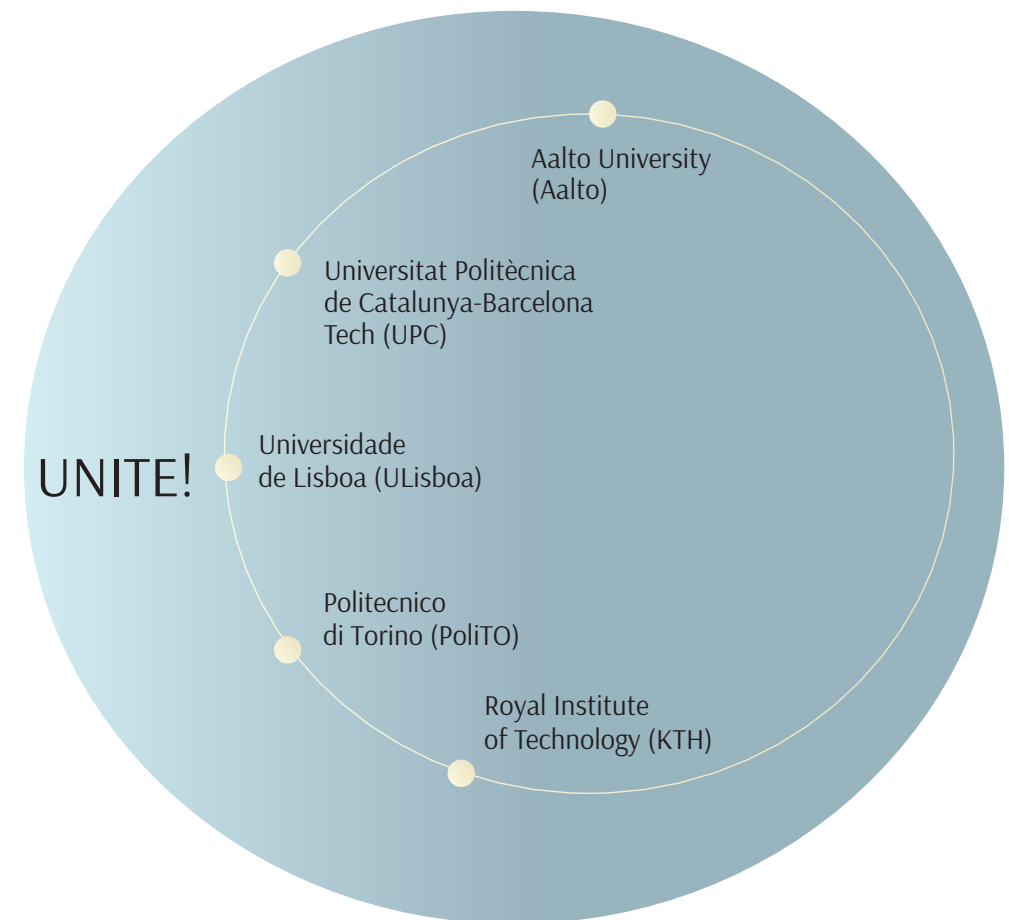


Figure 17. Network representation of the universities participating in the QUORUM project within the UNITE! European University Alliance.

What is QUORUM: vision, objectives and structure 3.2

In light of the ongoing natural disasters – particularly those involving water – and the climate change that has transformed and continues to transform cities into uncertain environments, there is a need to strengthen interdisciplinary collaboration to implement sustainable, transformative solutions. This has had a significant impact on education and research, ensuring that they provide support for this type of collaboration. The project “Quest for Urban Obdurate Resilience in Uncertain Milieus” (QUORUM) has taken centre stage: addressing urban challenges related to water and climate through interdisciplinary collaboration within the Unite! universities (UNITE!, 2024). The aim of the QUORUM project was to design a curriculum that addresses urban water-related challenges. The interdisciplinary module focused on re-examining rivers in the urban environment, considering them both as elements deeply rooted in local cultures and as resources that provide ecosystem services. The programme placed students at the centre to support col-

laborative, multicultural and interdisciplinary activities that propose sustainable transformations of urban rivers (Aalto University, 2024). However, as the project developed, the focus broadened to encompass a more general conception of water in the urban environment. The final module, in fact, takes into account a variety of natural water-related features found in the urban context, such as seafronts, bays, rivers and other water systems, which vary depending on the geographical and urban context of the university coordinating the project. In this way, the module also incorporates the diverse perspectives of the other partner universities, each located in different urban contexts. Water is thus interpreted as a central component of the urban ecosystem and as an element capable of influencing the environmental, social, cultural and design aspects of the contemporary city. The project aimed to achieve three specific objectives, each aligned with a work package.

“Exchange knowledge on urban river pedagogies”, Work Package 1 (WP1), was coordinated by Professor Christine Mady of Aalto University and focused on sharing expertise in urban rivers education, initiating the project, and presenting the team’s educational strategies within their respective courses. Additionally, the package included a literature review regarding interdisciplinary, collaborative and multicultural pedagogies, as well as joint student activities aimed at building the competencies necessary to develop resilient solutions in uncertain contexts. The main goal was to investigate interdisciplinary, multicultural and cooperative teaching methods at partner universities, placing water as a central resource.

After the initial theoretical phase, Work Package 2 (WP2), “Co-design the urban rivers module”, began with a workshop at the Polytechnic University of Turin led by Professor Elena Comino. This workshop focused on collaboratively developing the future module and developing its programme. This initial phase also included the thesis project described here, which involved direct participation in the QUORUM team and in the design of the module,

alongside a research phase carried out at Aalto University, through a period of mobility for thesis research abroad. This experience was chosen and made possible by Aalto University’s role as project coordinator; it allowed for active contribution to the working group’s activities and the development of the module’s content, which will be partly implemented within this very academic context. During the first meeting held as part of the workshop, the entire project team participated, and students were actively involved in design discussions from the start. Their feedback and ideas shaped the co-design of the module, guaranteeing it reflected student opinions and needs.

“Communicate outcomes”, Work Package 3 (WP3), focused on communicating results and sharing lessons learned from the project. The team presented their work at Unite! alliance conference, highlighting the pedagogical approaches used to engage students – specifically interdisciplinary, multicultural, and collaborative methods. They also explained the course structure and organisation. Professor Arnold Pears of KTH Royal Institute of Technology led this work package (UNITE!, 2024).

Partner universities and the European framework for collaboration 3.3

The project team brought together distinguished academics from the five Unite! partner universities, each with unique expertise in interdisciplinary research and teaching on the climate crisis. Professor Christine Mady, coordinator of the project and a senior lecturer at Aalto University, is recognised for her leadership in urban studies and planning, as well as her research in education, interdisciplinarity, and sustainability. In addition, her work on public spaces explores spatial justice and the dynamics of everyday life and instability. Professor Paulo Pinho, also a senior lecturer at Aalto University, specialises in electrical engineering and solid-state agricultural lighting, with a particular focus on LED technologies and university pedagogy. Professor Andrea Botero, Associate Professor at Aalto University, is well known for her contributions to participatory design and her research on the relationships between designers and users in socio-technical transformation. In addition to the Aalto University team members, the project also benefited from the expertise of Associate Professor Elena Comino at Politecnico di Torino. Professor

Comino is recognised for her work in applied ecology for engineering, the development of environmental sustainability procedures, and the environmental management of industrial activities. At the University of Lisbon, Assistant Professor Sérgio Proença is a leading figure in urban planning, with an extensive body of research on urban morphology. From the Universitat Politècnica de Catalunya-Barcelona Tech, Full Professor Álvaro Clua is a specialist in urban design, bringing a wealth of experience in architectural education. Finally, the team's commitment to pedagogical innovation is underscored by Professor Arnold Pears of KTH Royal Institute of Technology (Kungliga Tekniska Högskolan). As a prominent researcher in engineering education, Professor Pears focuses on advancing teaching practices to address the evolving needs of society and the global context of engineering (Aalto University, 2024). Working with a team comprising such a wide range of knowledge has enabled us to incorporate diverse perspectives into the module's design and has facilitated effective discussion of differing viewpoints amongst the group members.

The role of the QUORUM program 3.4

The QUORUM project provides a flexible framework for innovative educational initiatives. Designed as a Blended Intensive Programme (BIP), its structure aligns with European educational priorities aimed at preparing students for complex, real-world challenges. By integrating interdisciplinary and international perspectives, QUORUM supports the development of key competencies needed to address the Sustainable Development Goals (SDGs), including SDG 11 (Sustainable Cities and Communities), SDG 13 (Climate Action), and SDG 14 (Life Below Water and Sustainable Use of Marine Resources) (European Commission, n.d.; Aurora Universities Network, n.d.). From an educational perspective, the project stands out for its use of innovative and participatory methodologies, such as co-design and blended learning, comparing practical and collaborative approaches with more traditional ones and emphasising, amongst other things, experiential learning. A central element has been interdisciplinary and international collaboration, which has integrated expertise from various fields such as urban planning, design, engineering, ecolog-

gy, and pedagogy, and has prioritised dialogue across disciplines. The inter-university structure of the project also fits into this system, involving Aalto University, Universidade de Lisboa, Politecnico di Torino, Universitat Politècnica de Catalunya and KTH Royal Institute of Technology, creating a genuine transnational educational network. In this sense, the module acts as a 'bridge between universities and local communities', helping to train professionals capable of tackling complex and system-wide challenges. The project aims to have a significant impact on the curriculum and students' skills, fostering the development of systemic, project-based, and intercultural skills, and demonstrating various ways to integrate the module into university settings. QUORUM is an example of systemic educational design, as it embodies principles such as a holistic approach, the management of complexity, and the design of networks and relationships. For this very reason, the project is not merely a teaching module, but also constitutes a case study in systemic educational design (Erasmus+ Italia, n.d.; Erasmus BIP, n.d.; UNITE! University Network, n.d.).

Water resources in an urban environment

Proceeding step by step, in this chapter, we will analyse the central theme of the QUORUM project: *water resources* in urban environments and their various aspects. Given that water is a primary resource for every *living being* on the planet, including the earth itself, it is *essential* for achieving the sustainability of human societies to raise awareness of this *resource* within a complex *environment* such as the urban one.

Understanding water in urban environments: functioning, dynamics and criticality 4.1

When we consider the theme of water in these terms – as a global resource and an essential asset – its dual nature becomes a key point. Firstly, it is a resource that shapes, generates landscapes and moulds societies, giving rise to both natural and man-made spaces; secondly, its brutal aspect emerges as a force that bursts forth, alters and destabilises the land. The idyllic image gives way to uncertainty and assumes an emergency-driven significance, requiring communities to reinvent their relationship to it. Within this duality of values, the relationship between humans, the environment and water has led to a focus on the consequences of extreme adverse weather events for cities and the wider territory. Faced with potential crises that could arise within a country – such as population growth and ongoing urban expansion, alongside increasingly frequent extreme events, social inequalities, and fragmented governance – meeting the growing demand for water is a problem that should not be underestimated (Niemczynowicz, 1999). Over the past four decades, global water use has increased by 1%, and this trend is expected to continue until 2050. Today, 10% of the world's population lives in countries experiencing significant water stress. Regardless of income level, all countries show signs of risk in the quantity and quality of available water resources (Rocchi, 2025). Among the current challenges centring on urban

water management are: the supply of drinking water to growing cities; access to sanitation; the recycling of nutrients from wastewater; irrigation using wastewater; urban agriculture; and the recharge of depleted aquifers. Added to these are social equity and the transfer of knowledge and new technologies, viewed on a broader scale (Niemczynowicz, 1999). Human activities and climate change together create water imbalances in river basins worldwide (Rocchi, 2025). For example, uncontrolled urban growth significantly changes soil physical characteristics, making agricultural areas and rural ecosystems that support human activities more fragile. This leads to informal settlements which result in extreme poverty. It is therefore clear that the success of technical solutions is not independent of factors such as climate, and social, economic and cultural conditions (Niemczynowicz, 1999). However, the culture and practice of emergency management operate almost exclusively through forecasting, assessing damage, and developing containment strategies. In fact, hydraulic infrastructure is increasingly disconnected from community needs, confined to emergency situations, and managed as a system separate from urban dynamics. Whilst effective in the short term, this strategy has failed to recognise water as an element of identity, aesthetics, ecology and functionality within the human environment.

It is against this backdrop that modern hydraulic engineering systems operate, linking human safety, access to water within an urban environment, and—no less importantly—the symbolic and cultural narrative surrounding this resource. We face a holistic vision, understood as a complex ecosystem, in which the environmental aspect is inseparable from the social, spatial, and managerial dimensions. In this context, water, among the objectives of the **2030 Agenda**, is seen as a central element: it contributes to people's well-being and health (**SDG 3**), is a resource to be managed and regenerated efficiently (**SDG 6**), and represents a fundamental component of the sustainable city (**SDG 11**), capable of linking green and blue infrastructure, landscape and community (Falzetti, 2025).



Figure 18. Sustainable Development Goals relevant to urban water systems: SDG 3 (Good Health and Well-being), SDG 6 (Clean Water and Sanitation) and SDG 11 (Sustainable Cities and Communities). (United Nations, 2015)

The role of water in contemporary urbanisation processes

4.2

The relationship between water and the city goes far beyond simply regenerating specific districts; it encompasses the wide-ranging urban, landscape, and environmental challenges that accompany urbanisation. Many cities are reimagining and reconstructing their waterfronts—whether along rivers or the sea—to respond to these pressures. Scholars such as anthropologists, historians, and geographers consistently highlight the structural and symbolic significance of water. Water serves as a barometer of urban growth and decline, reflecting changes in the environment and society and gradually becoming an integral part of the urban landscape and local identity. Today, a growing number of cities are adopting a new vision for waterfront development. This vision involves understanding and responding to the unique needs of local communities, prioritising sustainability, and developing broad, forward-thinking policies. The ultimate aim is to create inviting public spaces that attract residents, tourists, and citizens, seamlessly integrating with the rhythms of urban life. The French concept of 'habiter' captures this idea of continuous, lived engagement with urban spaces. In contrast, some projects, such as artificially constructed islands or planned neighbourhoods in cities like Dubai, demonstrate the pitfalls of prioritising

show over substance. These developments often lack history, culture and a feeling of belonging, resulting in environments that feel manufactured rather than authentically lived (Melgarejo Moreno, Martí Ciriquian and Molina Giménez, 2016). In contrast, towns that adopt a multifunctional approach to water management achieve very different outcomes. By linking rivers, canals, floodplains, retention basins, parks, rain gardens and green roofs into interconnected networks they provide a range of vital ecosystem services. In these settings, restoring water bodies goes hand in hand with developing ecological corridors that extend into the surrounding environments. Concepts such as 'riverfront regeneration', 'green and blue infrastructure' and 'nature-based solutions' are increasingly shaping these approaches, offering integrated solutions to climate adaptation, environmental enhancement and community wellbeing (Sabbion, 2021).



Figure 19. Dubai Coast. (Peruccio Pier Paolo, 2025)

Waterfront regeneration is a phenomenon that first emerged following the decommissioning and abandonment of industrial areas, particularly port areas. The initial projects were aimed at enhancing urban appeal by improving the quality of open spaces in cities such as Baltimore, San Francisco, and Boston. In European cities, the process began in the 1990s. The first cases of conversion for tourism and leisure involved the oldest disused port waterfronts closest to historic centres. New urban landmarks and public spaces were created thanks to funding linked to major events, leading to the development of new attractions such as entertainment centres, museum clusters and multi-purpose spaces that have become landmarks for residents and tourists in Barcelona, Genoa, Lisbon and Valencia, and subsequently in Seattle and Brooklyn (NYC) in the USA, as well as many cities in Northern Europe such as Hamburg, Copenhagen, Helsinki, Oslo, Reykjavík, Rotterdam and Stockholm. A further development has taken place more recently, with major areas being redeveloped, such as London's Docklands,

the Thames Barrier Park, and the Olympic Park – built for the 2012 London Olympics on a derelict industrial site and featuring 250 different plant species – which stands as an example of large-scale landscape design. Following this trend, the most recent waterfront regeneration projects are increasingly focusing on the banks of major urban rivers. Restoring access to water in cities through the integration of pedestrian spaces has proved an effective strategy for the regeneration of large urban areas, the revival of the economy, and steering the city's development towards the restoration and landscape regeneration of existing areas. Planning approaches across different countries, whilst characterised by varying political traditions, design cultures and socio-economic contexts, have been distinguished by an evolution in the project approach. This has shifted from focusing on individual architectural elements to a vision of regeneration as a process embedded within broader temporal and spatial scales, encompassing landscape dynamics along with, consequently, natural, social and fiscal factors.

With regard to green and blue infrastructure, these systems require attention to the water cycle in all its phases through the sustainable management of rainwater, and they comprise various interconnected elements at different scales. Green infrastructure is, in fact, defined as “A strategically planned network of natural resources and semi-natural areas with environmental characteristics designed to provide a wide range of ecosystem services, both in rural areas and in urban contexts” (European Commission, 2015). In several countries, they have become a tool for tackling flooding and improving landscape quality. Rainwater management employs systems that integrate natural elements with technical, engineering and landscape solutions, in various national forms: Best Management Practices (BMPs, USA), Low Impact Development (LID, USA, Canada and New Zealand), Water Sensitive Urban Design (WSUD, Australia), Sponge Cities

(China), Sustainable Drainage Systems (SuDS, UK and Europe). The approaches and tools mentioned improve the natural water drainage system, provide strategies for understanding water in qualitative and quantitative terms, reduce erosion in river basins, decrease runoff during heavy rainfall events, and remove pollutants, thereby improving water quality. These solutions have influenced many cities, especially in North America (such as Chicago, Miami, New York and Portland) and Europe (such as Rotterdam, Amsterdam and Helsinki), which have developed climate adaptation plans that integrate water management and public space.

Cities are using solutions such as flood-prone squares, rain gardens, vegetated swales, green roofs and permeable paving to manage rainwater and improve urban quality. The aim is to integrate water management into urban design in a coordinated and sustainable manner.



Figure 20. Berlin Badeschiff. (Sabbion Paola & Berlin Badeschiff, 2021)



Figure 21. Watersquare Bellamyplein, Rotterdam / NL, 1017. (Sabbion Paola, 2021)

Case studies and design approaches for sustainable water management 4.3

By bringing together urban planning, educational, and interdisciplinary perspectives, the case studies analysed were selected to offer a fresh perspective on the role of water resources in contemporary urban contexts. Therefore, they have been organised into three conceptual frameworks that highlight different approaches to the interpretation, management, and enhancement of water. The first area considers water as an active element within the urban system. From this perspective, water is not viewed solely as a resource to be managed or contained, but as a dynamic component capable of influencing the urban form, ecological processes and social practices, as well as enhancing the perceived quality and overall value of the area. The projects included in this study demonstrate how rivers, canals and water infrastructure can be integrated into the urban fabric as ecological and spatial elements, contributing to the resilience of cities and the provision of ecosystem services. This area is identical to the examples provided and analysed in Chapter One.

The second area, on the other hand, focuses on educational and training approaches, exploring how the themes of sustainability and water management are conveyed and put into practice in academic and on-site contexts. In this context, water becomes both a pedagogical tool and a field for experimental design. The urban environment and its water resources serve as an open-air laboratory, where theory and practice intertwine. The third set of case studies brings together approaches that analyse and enhance water resources from a range of disciplinary perspectives. The projects demonstrate how technological solutions, urban planning strategies, and infrastructure projects can contribute to a more efficient, sustainable, and responsible use of water resources, as well as to improving the perceived quality and overall value of the area. The case studies have become tools for critical reflection and practical guidelines for beginning to outline the direction of new design and teaching strategies for the module and its structure.

The first area, water as an active element

Keilehaven Tidal Park – Rotterdam, Netherlands

Between 2018 and 2024, a former industrial harbour in the city of Rotterdam was transformed into a tidal park that acts as a natural flood barrier, while promoting biodiversity and urban resilience. The project transformed a port basin into a marine park, creating a new type of public space where the tidal landscape of the delta becomes accessible to tourists and residents. By creating environmental gradients (from wet to dry, from deep to shallow), this infrastructure supports both biodiversity and habitats for flora and fauna, whilst also serving as an ecological corridor for various species. The principles of the circular economy have been applied to this project through the use and reuse of materials sourced from other urban developments, thereby enhancing both its environmental sustainability and ecological value.

The case study remains a model of design that combines ecology, landscape, and urban use (DE URBANISTEN, n.d.).



Figure 22. Tidal Park Keilehaven, Rotterdam. (DE URBANISTEN, 2024)

Flussbad Berlin – Berlin, Germany

The target was to transform the Spree Canal into an urban natural swimming pool, improving water quality through ecological filtration whilst creating new public spaces. The redevelopment of the canal into a bathing area enhances Berlin's historic centre, strengthening its cultural, social and landscape dimensions. The case study combined the reuse of existing infrastructure with modernisation works. The project seeks to reactivate this space by making the river suitable for swimming, reviving a historical tradition and promoting greater environmental awareness and responsible water use (Das Projekt, 2024).



Figure 23. Fluss Bad Berlin. (Flussbad Berlin, 2024)

Sponge Cities – Vienna, Austria

Vienna has adopted the 'sponge city' concept, incorporating green spaces and permeable infrastructure to manage rainwater and mitigate the effects of climate change.

In Vienna, this concept takes the form of widespread measures such as green spaces, underground infiltration systems and natural infrastructure integrated into the urban fabric, which mimic the natural water cycle rather than channelling water rapidly into the sewers. These systems also help to cool the city, increase biodiversity and improve the quality of urban life (Abend, 2026).



Figure 24. An overview of the "Am Seebogen" neighborhood in Vienna, Austria. (Nolting Ingmar Björn, 2022)

Reflection – Marina di Camerota, Italy

An installation made by an artist and researcher in the field of interactive media, created for the 24th edition of the Meeting del Mare in Marina di Camerota, Italy. Eight architectural projectors, arranged along the pier over a length of 120 metres, illuminate the breakwaters with a colour sequence inspired by the hues of the rainbow. The festival's theme of diversity is reinterpreted through light. The refraction of the lights creates a rainbow over the sea that illuminates the night, visible from various vantage points. The theme of reflection is thus manifested both visually and emotionally, reworked by the observer. The coastal landscape is transformed into a luminous composition capable of conveying a sense of hope and welcome towards the future (Rizzuti, 2022).

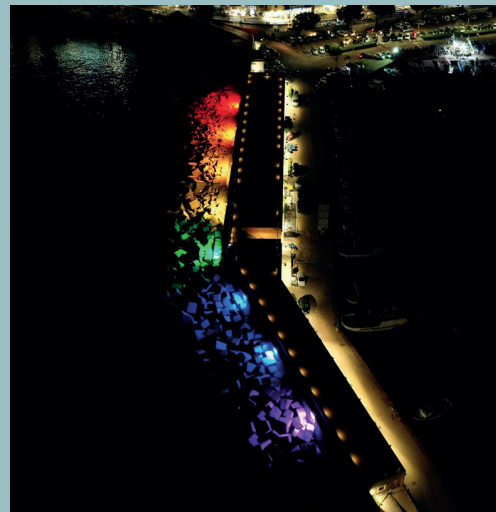


Figure 25. Reflection. (Rizzuti Cristian, 2022)

RivEr/Generation_LAB – Rome, Italy

The "Barada RivEr/Generation_LAB" project, promoted by the PDTA Department of Sapienza University of Rome, is a research and design initiative that forms part of the international scientific cooperation between Sapienza University and the University of Damascus. The theme addressed is the urban and environmental regeneration of the Barada River. The "Barada RivEr/Generation_LAB" project, promoted by the PDTA Department of Sapienza University of Rome, is a research and design initiative that forms part of the international scientific cooperation between Sapienza University and the University of Damascus. The theme addressed is the urban and environmental regeneration of the Barada River in Damascus, in a context severely compromised by drought, reduced rainfall, human pressure and pollution.

Through a workshop and a design laboratory, the project focuses on experimenting with integrated intervention strategies that combine urban planning, environmental design, and landscape ecology. The main objective is to transform the Barada river course into a structuring ecological and landscape infrastructure, capable of acting as a 'green and blue backbone' for the city and of triggering regeneration of the historic urban fabric (Dipartimento di Pianificazione, Design, Tecnologia dell'Architettura, n.d.).

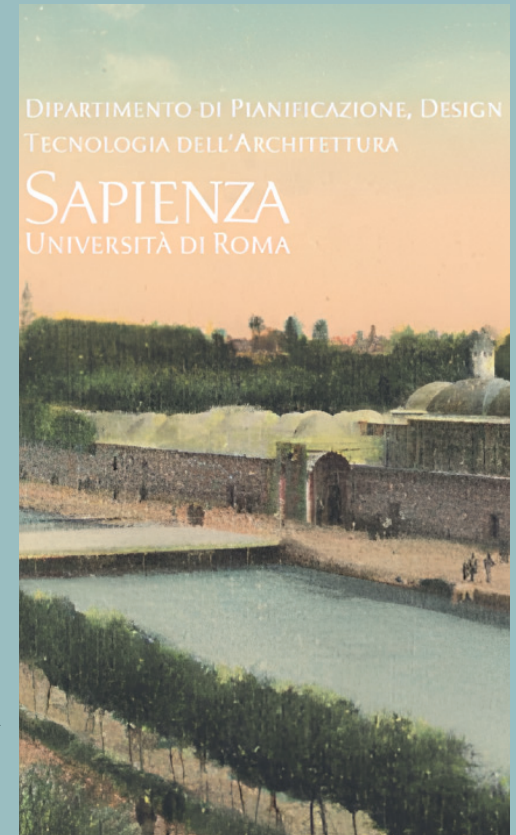


Figure 26. RivEr/Generation_LAB Call. (PDTA,n.d.)

The second area, educational and training approaches

Science Barge – Yonkers, New York, USA

The Science Barge is a floating urban farm that serves as an environmental education centre on the Hudson River. The barge grows vegetables using a hydroponic system powered by renewable energy and irrigated with rainwater and desalinated river water. It serves as an educational tool to raise awareness of sustainable agriculture and water management. The project represents a model of sustainable urban agriculture, capable of producing food with net-zero carbon emissions and no pesticides or effluent, demonstrating that it is possible to grow crops in urban settings with limited resources. At the same time, the Science Barge plays a central educational role: it offers programmes on climate change, river ecosystems, and sustainable food production, serving as an experimental laboratory that combines technology, ecology, and learning (Groundwork Hudson Valley, 2026).



Figure 27. Science Barge (Groundwork Hudson Valley, n.d.)

“River Journey” – Minnesota, USA

The educational project “River Journey: Art-led, Place-based, Experiential Environmental Education” guides high school students in Minnesota along the water’s journey, from source to tap. It combines physical exploration and artistic storytelling within a “place-based” context, that is, one closely linked to a specific location. This gives students a deep understanding of urban water systems and their impact on the environment; it also helps bridge the gap between humans and nature, demonstrating how sustainability can be learned more effectively through direct experience. The theoretical framework is the “Earth Systems Journey”; students take part in field activi-

ties, such as excursions, canoe trips, visits to water treatment plants and meetings with experts, thereby building a concrete and systemic understanding of the water cycle. From an educational perspective, the programme combines science, mathematics, history and language, enriched by artistic and narrative tools such as poetry, creative writing and the creation of symbolic objects. In addition, digital technologies such as GIS and interactive maps are used to create multimedia narratives. The programme begins with direct field experience, moves on to reflection through storytelling, and concludes with the public sharing of results (Journal of Sustainability Education, n.d.).



Figure 28. Students from River's Edge Academy Collect Water Quality Data at Sucker Lake. (Brigham Jonee Kulman, 2016)

Mississippi River Learning Centre – Saint Paul, Minnesota, USA

The aim of the project is to redevelop an area along the Mississippi River, transforming it into a centre for river exploration and learning. The centre will offer educational programmes, recreational activities, and community spaces, fostering connections between people and the river. The project forms part of a broader strategy: to strengthen the relationship between the community and the waterway, which is regarded as a fundamental ecological, cultural and identity-defining resource. The underlying idea is to create a physical and symbolic access point that allows residents and visitors to engage directly with the river environment through

practical experiences such as sports, guided tours and educational workshops. Environmental restoration, light infrastructure, social equity, cultural and historical dimensions, and ecology are integrated within this framework to demonstrate how an educational and recreational infrastructure can act as a catalyst for sustainability (Saint Paul Parks Conservancy, n.d.).



Figure 29. Mississippi River Learning Center. (Saint Paul Parks Conservancy, n.d.)

Urban Water Lab – Milan, Italy

The Urban Water Lab at the Politecnico di Milano brings together research and case studies that analyse the behaviour of water in urban areas and the effects of urbanisation on the natural hydrological cycle. The central theme is that urban growth profoundly alters how rainwater moves and is managed.

The laboratory therefore, studies the main critical issues related to water and, based on these problems, proposes solutions grounded in an approach that includes the use of green infrastructure, sustainable urban drainage systems and interventions that mimic natural processes to promote infiltration and the widespread management of rainwater. Specifically, activities include collaborations on research projects, teaching activities, and active participation in the organisation and scientific support of congresses, conferences, seminars, and workshops. (Urban Water Lab, n.d)



Figure 30. Urban Water Lab. (Urban Water Lab, n.d.)

Venice Water Lab – Venice, Italy

The Venice Water Lab, the Water Centre of the Università IUAV of Venice, is a centre dedicated to the study of water and the sea, with a particular focus on the relationship between water and the city, primarily in the context of Venice and other coastal cities. The purpose of the project is to transform Venice into an international urban and lagoon laboratory, where water is not merely a subject of study but also a structural element upon which research, teaching and design are based. The laboratory addresses the theme of water in all its complexity, encompassing the water cycle, urban infrastructure, maritime planning and the management of coastal systems in relation to climate change and rising sea levels.

The Venice Water Lab integrates postgraduate courses and research activities to train professionals capable of working on water cities and coastal areas. The approach is interdisciplinary, combining engineering, urban planning, architecture, and environmental sciences. The laboratory thus functions as an academic and research environment that uses Venice and its lagoon as a real and ongoing case study, where resilient intervention strategies for the future can be tested (Università IUAV di Venezia, n.d).

CS4RIVERS – Exploring river ecosystems

The CS4RIVERS case study on bioindicators (macroinvertebrates) focuses on monitoring the ecological quality of watercourses and the aquatic organisms belonging to the benthic macroinvertebrate group. These organisms, which are sensitive to changes in environmental conditions, are used as biological indicators to assess the health of river ecosystems. The initiative combines scientific research with the active participation of citizens and students, promoting a citizen science approach aimed at understanding and protecting river environments. Field sampling, the collection and classification of macroinvertebrates, and the subsequent interpretation of data to identify any forms of pollution or alteration of the watercourse are the main activities (CS4RIVERS, n.d).

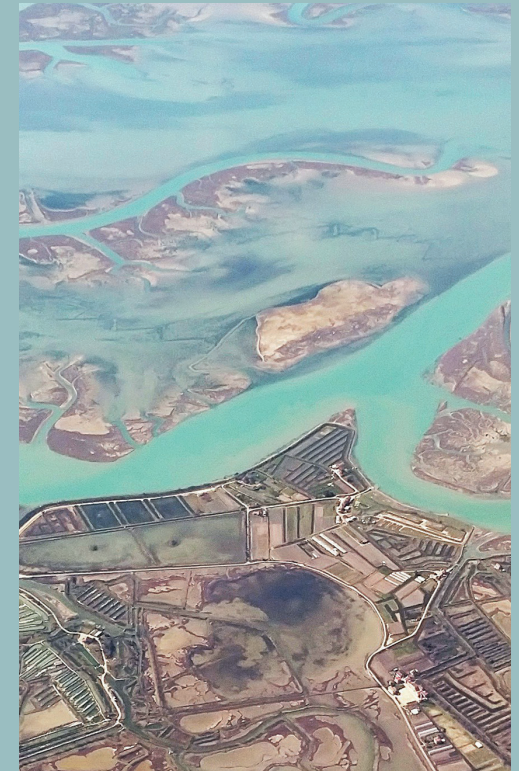


Figure 31. Venice Water Lab. (Università Iuav di Venezia,n.d.)



Figure 32. Macroinvertebrate Community Monitoring . (CS4RIVERS,n.d.)

Pedagogical approach of the educational module

The *pedagogical* and didactic choices made in the design of the *teaching* module were informed by an analysis of the relevant *literature*.

Expected Learning Outcomes (ILO)

5.1

The pedagogical and didactic choices made in the design of the teaching module were informed by an analysis of the relevant literature. The research initially focused on defining the Intended Learning Outcomes (ILOs) within a learning programme, and these were subsequently developed and defined for the project's teaching module. Through theoretical analysis, we gained an understanding of what ILOs are, how they are structured, and how they are observed, measured, and perceived by students and teachers. The ILOs clearly set out the competences and skills that students will have acquired by the end of an educational programme. Given that a learning outcome is understood as the result of an action from which various outcomes may emerge – whether intentional or unintentional, desirable or undesirable – it can be said that: “a learning outcome is the result of learning” (NTNU, n.d.). When formulating learning outcomes, they must be specific and clearly defined, avoiding grouping multiple outcomes into a single outcome. The order to follow when constructing the sentence should be: verb, object, level and context. Specifically, the verb specifies “how students will

demonstrate that they have learnt”; the object indicates “what students will demonstrate”; the level defines “the extent to which the expected outcome will apply”; and the context provides a sentence that clarifies the context of the verb and the object. Finally, in order to assess these results, they must be observed or measured. Indeed, educational institutions issue certificates of completion and set out what is expected at the end of a programme. These have clear implications for both students and teachers: students can focus their studies on a clear objective, whilst teachers can tailor their teaching and assessment activities accordingly. Between the 1950s and 1970s, the psychologist Benjamin S. Bloom and a committee of academic experts published ‘Taxonomy of Educational Goals: The Classification of Educational Objectives’ (NTNU, n.d.). Three domains of learning were identified: the cognitive, psychomotor and affective domains, with the aim of fostering higher-order thinking skills in education. Cognitive (knowledge) – thinking: it concerns what one learns to know. It encompasses the way in which one understands, analyses, evaluates and creates new ideas.

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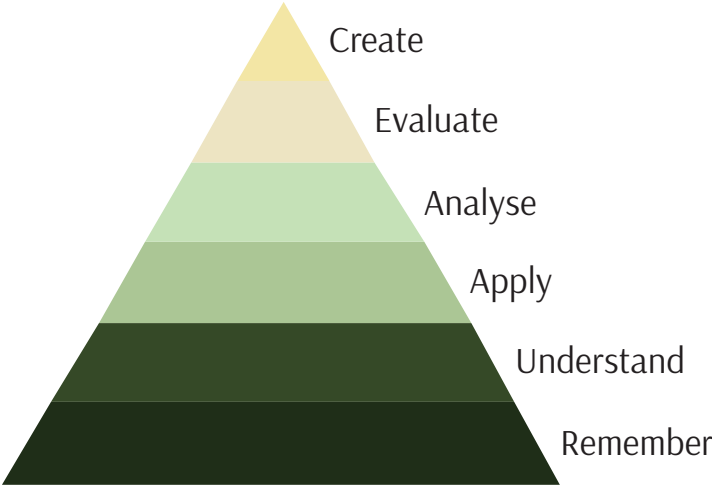


Figure 33. Taxonomy of Cognitive Learning Levels for Intended Learning Outcomes. (Norwegian University of Science and Technology, 2026.)

Affective (attitude) – feeling: directs how one reacts emotionally to what one learns. It encompasses values, interests, motivations and attitudes. For example, over time, experiences change how one views the world or relates to others.

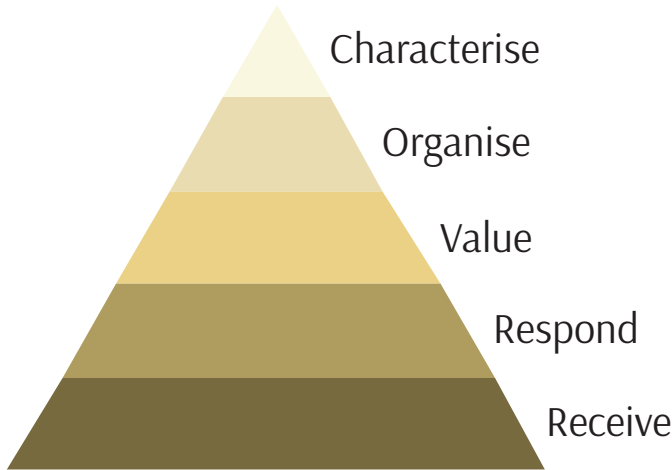


Figure 34. Taxonomy of Affective Learning Levels for Intended Learning Outcomes. (Norwegian University of Science and Technology, 2026.)

Psychomotor (skills) – doing: this refers to what one is able to do with one's body, i.e. practical skills. It is not just about moving, but about gradually improving one's ability to perform practical tasks (e.g. using a tool, writing, drawing, etc.).

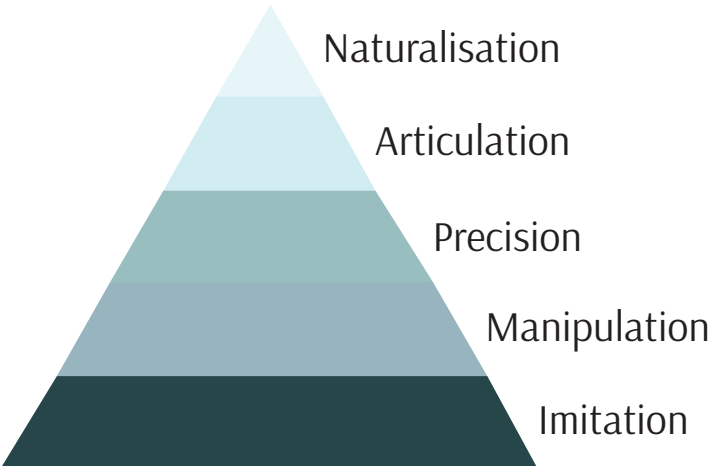
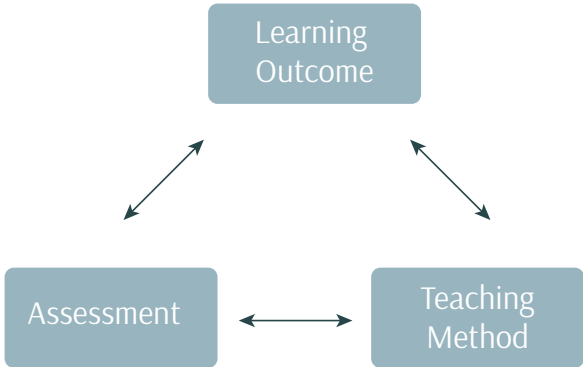


Figure 35. Taxonomy of Psychomotor Learning Levels for Intended Learning Outcomes. (Norwegian University of Science and Technology,2026.)

The three domains and the relevant taxonomies have been reviewed by educational psychologists over the years and are now used as useful tools for designing teaching and training programmes. When using taxonomies to formulate Learning Objectives (LO), it is important to consider the students' entry and exit points: what is their prior learning level, and to what level do we intend to bring them? Analysing both areas will enable the definition of appropriate learning objectives that meet the expectations of both students and teachers. Continuing with the theme of balance, con-

structive alignment plays a fundamental role. In this scenario, both the student and the teacher have specific roles: the student must engage in educational activities to shape their own learning, whilst the teacher must simultaneously foster a supportive environment for these activities. The answer is that the components of an educational system—the curriculum and learning objectives, the teaching methods used, and the assessment activities—must be aligned with one another. Indeed, a constructive alignment matrix can assist in designing the system (NTNU, n.d.).

In designing the educational module, the taxonomies and the constructivist alignment matrix were used during the first two work packages (WP1 and WP2) to formalise the expected learning outcomes. In particular, the latter was used to outline and structure the module's activities.



Learning Outcomes: <i>On completion of this module students should be able:</i>	Teaching / Learning Activities	Assessment Methods
To identify the main signs and symptoms of multiple sclerosis.	Lecture on various signs/symptoms, In class exercises/quizzes on terminology.	Kahoot Quiz (formative) MCQ Test (summative)
To formulate and products using selected ingredients	Lecture presenting case studies of the design history of some market leaders. Students plan own project and present as poster. Student project on food formulation.	Presentation of end product (formative) Poster Display (summative)
To identify and develop an area for research in the discipline	Presentation of examples of research questions, Student discussion groups on research areas.	Presentation of findings (formative) 1,000-word research proposal (summative)
To demonstrate effective presentational skills		In-class presentation (formative) In-class graded presentation (summative)

Figure 36. Constructive Alignment Matrix. (Norwegian University of Science and Technology,2026.)

Active and collaborative teaching practices

5.2

In line with the description in the section on Expected Learning Outcomes, this parallel section outlines the methodologies used to achieve these outcomes, which guided the module's teaching activities. As explained in Chapter Two, which presented the QUORUM project, students in this context are not passive recipients of information but active participants in the process of constructing the module. Priority is given to the dynamics of interaction, group work and discussion within an interdisciplinary setting. This issue is first explored in a study by Arnold N. Pears, published in ACM Inroads in 2010, which offers a critical reflection on the meaning and value of globalisation and intercultural collaboration in universities, making it a central topic of discussion. Universities and industry emphasise the need to make room for graduates with skills relevant to the global market; this has led to questions about whether universi-

ties themselves are driven or influenced by the mass media, and whether intercultural collaboration actually offers added value to students. Gaining skills and experience through working or studying abroad and in international teams is highly relevant to the fields of engineering and computer science; it is no coincidence that degree programmes in these two disciplines actively encourage this approach. Although these issues are central to many European universities, student demand for these programmes is declining, and there is uncertainty about students' interest in these opportunities: some data suggest that students do not appreciate many of the opportunities on offer and tend to isolate themselves or refrain from participating in intercultural experiences. The main obstacles could arise from the importance of final grades, international collaboration, linguistic, cultural and communication difficulties. Addressing these uncertainties could be

the first step towards establishing the value of globalisation in university curricula. According to Pears, if institutions promote intercultural cooperation as an educational value rather than treating it as a source of income, this risks undermining traditional academic values, leading students to view their degree as a mere product or certificate rather than a journey of knowledge and personal development. The success of these initiatives depends on various factors, including the quality of communication between academics and the administration, and the importance of focusing objectives on social rather than economic interests. The focus is on the benefits this education can bring to students, universities, and society to create a sustainable working environment. To make this approach effective and create such an environment, it is important to understand how students relate to the learning process. Analysing the different approaches adopted allows for a

more informed orientation of teaching activities and their educational impact (Pears, 2010).

A study by Arnold Pears and Lars-Åke Larzon, presented at Koli Calling 2006, revealed three approaches – deep learning, surface learning, and outcome-oriented learning – that students can adopt individually or in combination. A group of university students, all on the same course, were asked to reflect on the lectures and courses they had attended, identifying interesting aspects, key areas of learning, difficulties and unclear points. The analysis revealed that the responses could be divided into three broad categories: formal, written to complete the task without any real application or self-reflection; insightful, produced critically on what they had learnt and on their gaps in knowledge; and communicative, where the student took the opportunity to engage directly with the lecturer. Over 80% of the responses fell into the second category, suggesting that the exercise had effectively stimulated deep learning processes.

The feedback given at the end of each reflection was appreciated by the students who had benefited from it. They cited the main advantages of reflective practice as greater awareness of what they had learnt, better identification of their weaknesses, and more active engagement during lessons. From the teachers' perspective, the reflections provide valuable information on students' level of understanding, their difficulties and their interests, as well as making teaching more dynamic and interactive. This experience demonstrates that integrating written reflections into university courses is an effective practice for active learning and formative assessment. This method was incorporated into the module to gather feedback on the proposed activities; the steps followed for its implementation and the results will be detailed in Chapter Eight (Pears & Larzon, 2006).

Innovative teaching and learning methods play a central role in translating the pedagogical approach into concrete practice. These methods are designed to promote active, participatory and student-centred teaching. These approaches go beyond traditional methods, placing emphasis on students' direct involvement, collaborative work, and the application of theoretical knowledge in complex contexts. The strategies aim to develop critical thinking, problem-solving, collaboration, autonomy and individual and group responsibility. Students become active participants in the learning process, whilst the teacher takes on the role of facilitator and guide. Among the methodologies, some move theoretical input outside the classroom (videos, short readings) to devote face-to-face time to practical activities (application, discussion, problem-solving), such as the **Flipped Classroom**. **Think-Pair-Share (TPS)**, on the other hand, poses an open question to the class, increasing participation and the quality of responses. Still on the subject of debates, with the **Jigsaw method**, each group in the class becomes an expert on a sub-topic and teaches it to the rest of the class; or, by implementing **Peer Teaching**, students get

involved as co-teachers on a specific topic, guiding them in the explanation, the choice of examples and the handling of questions addressed to the whole class. The **Socratic Method**, based on teacher-guided dialogue, is also very similar.

Turning our attention to problem-solving, we find **Team-Based Learning (TBL)**, in which students work in teams to solve problems or complete complex tasks. Moving on, **Problem-Based Learning (PBL)** is a method based on real or realistic problems, often open-ended and without a single correct answer. One of the most common methods in this category is the analysis of **case studies**, specifically real or simulated cases (e.g. companies, experiments, historical events).

Finally, a technique that combines questions, problems and other materials is the **Gallery Walk**, an active method in which students move between different points or stations within the classroom, where materials, posters, questions or problems are displayed. (Aalto University, 2025)

Some of these techniques have been used as a reference point for designing the module's activities.

Education for sustainability and
transformative pedagogies

5.3

By broadening the scope of pedagogy and applying it to the environmental and urban challenges associated with climate change, Education for Sustainability aims to help students develop the knowledge, skills and values – including those of a general nature – needed to address complex socio-ecological issues. Educators who make sustainability education a transformative form of education frame their teaching needs within a transformative, action-oriented pedagogy, characterised by elements such as self-directed learning, participation and collaboration, problem-based learning, interdisciplinarity and transdisciplinarity, and a holistic approach. Another model that is being adopted involves providing sustainability-focused curricula to teacher training centres; the CSCT model (Curriculum, Sustainable Development, Competences, Teacher Training). The teacher is treated as an individual within an educational institution, and a member of a particular society, and the model itself identifies the competences of Education for Sustainability in three dimensions: teaching/communication, reflection/vision, networking and five domains, in other words, knowledge, systems thinking, emotions, values, ethics and action. There are numerous competency models for educators in this field, and according to one study, these are analysed by examining specific questions:

“What are the conceptual and pedagogical approaches to sustainability, and what competencies are used to develop these frameworks and models?

What are the different types of educator competencies included in the frameworks and models, and in particular those aimed at promoting transformative perspectives?

What pedagogical strategies are applied to develop educators’ competences, and in particular those aimed at promoting transformative practices in the field of sustainability education?”

(Corres et al, 2020).

From a pedagogical perspective, and thus in response to the first question, studies and models converge on the principles mentioned at the outset: collaboration, participation, interdisciplinarity and action-oriented learning, whether student-led or adopted by educators in their teaching. Among the aspects highlighted are critical reflection, emotional regulation, active citizenship, interdisciplinary work and the ability to link theoretical content to real-world problems. Moving on to the competences attributed to educators, three main classifications emerge: “Learning to know, Learning to be and Learning to do” (Corres et al, 2020). According to the study, most skills fall into the third category, in which educators act as mentors to students, helping them develop critical awareness and the ability to take action in complex contexts. Finally, among the strategies in the “Learning to Know” sphere, activities primarily focus on developing critical and scientific thinking through discussion and research. “Learning to be”, on the other hand, emphasises dialogue, interdisciplinary teamwork and reflective activities. “Learning to do” focuses on practical, participatory activities, such as projects addressing real-world problems and collaborations with local authorities (Corres et al, 2020). The most effective tools for assessing students’ skills are self-assessment and pre- and post-course surveys, whilst other tools, such as rubrics and a reflection template for teachers, are used less frequently (Imara & Altinay, 2021).

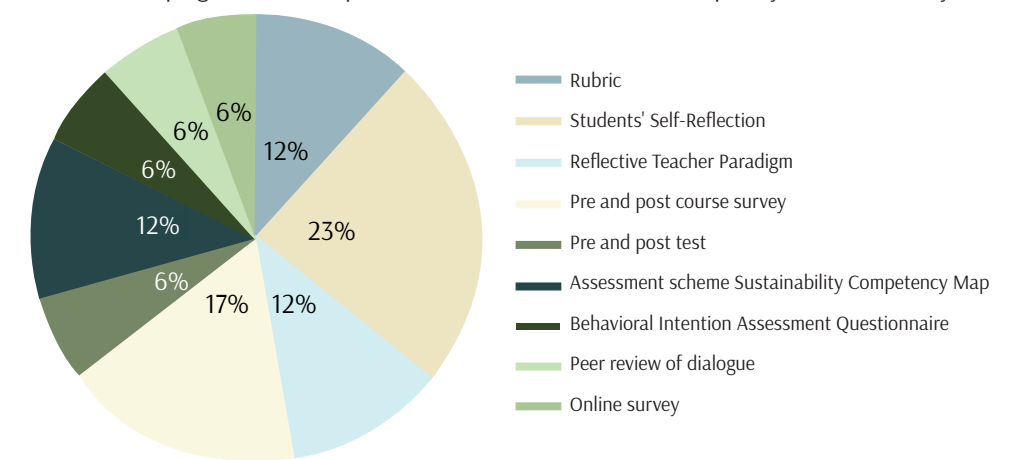


Figure 37. Assessment Tools Proposed or Used to Evaluate the Development of Sustainability Competencies. (Imara & Altinay, 2021)

The international team's perspectives and disciplinary challenges

6.1

Multidisciplinarity, interdisciplinarity and transdisciplinarity were the three pillars underpinning the team's entire work; the first allowed everyone to express their own language, methods and boundaries to arrive at a common theme, and took on greater significance within the first work package (WP1). Multidisciplinarity and interdisciplinarity enabled the fusion and cross-fertilisation of this knowledge, transcending disciplinary boundaries; the latter gained greater traction from the second work package (WP2) onwards. The work packages explored interdisciplinary, multicultural, and collaborative teaching methodologies used in courses on water (rivers, waterfronts, coastlines) in urban settings at the team's universities, with participants sharing insights into their teaching practices. From the perspectives of computer science and pedagogy, this approach highlighted a path towards balancing these two disciplines and the need to develop collaborative and cross-disciplinary skills useful for interdisciplinary work. The importance of assessment is emphasised not merely as a means of measurement but as a motivational tool that encourages students to explore beyond the traditional boundaries of their discipline. The value of experimentation and failure emerges as integral to learning, especially in interdi-

disciplinary and multicultural contexts. A number of recurring challenges in these areas were also identified, including cultural and communication differences, varying work habits and reference points, differing levels of motivation, and language barriers. The work packages explored interdisciplinary, multicultural, and collaborative teaching methodologies used in courses on water (rivers, waterfronts, coastlines) in urban settings at the team's universities, with participants sharing insights into their teaching practices. From the perspectives of computer science and pedagogy, this approach highlighted a path towards balancing these two disciplines and the need to develop collaborative and cross-disciplinary skills useful for interdisciplinary work. The importance of assessment is emphasised not merely as a means of measurement but as a motivational tool that encourages students to explore beyond the traditional boundaries of their discipline. The value of experimentation and failure emerges as integral to learning, especially in interdisciplinarity and multicultural contexts. A number of recurring challenges in these areas were also identified, including cultural and communication differences, varying work habits and reference points, differing levels of motivation, and language barriers.

These reflections have been translated into practical examples that focus on developing collaborative skills among students engaged in study projects that require them to extend their creative work to collaborate with other experts and users. 'Language vocabulary game' activities help participants build a shared understanding of common concepts and examine personal and professional biases right from the start of the course.

It has been presented as a good warm-up activity for various topics that require participants to work together. Carrying out the activity also has the advantage of allowing people to get to know one another in an original way that stimulates their creativity. Various challenges include making moments of self-reflection and peer learning more explicit in the design process and providing practical examples of how one might help other users participate in it.

Urban planning programmes have continued these teaching practices by placing students at the centre, supporting them in analysing complex urban problems, developing strategies and proposing action plans to address them through interdisciplinary knowledge and methodologies. In this way, students become co-creators of knowledge and co-designers of the methodologies used to inform their proposals.

From the perspective of **architectural studies**, the pedagogical approach was adopted by integrating it with an understanding of urban morphology, as well as anthropological and sensory aspects, in order to comprehend the context. The course proposed a design-by-layer approach (QUORUM, 2025), in which students are encouraged to analyse elements of the urban landscape from a technical and

architectural perspective. Basic methods with simple rules are used to stimulate students' creativity and autonomy within a precise code for representation and model-making. Furthermore, these practices help unpack the complexity of a vulnerable urban landscape, particularly when integrating inputs from diverse sources and disciplinary fields.

Within the **field of architecture**, other ideas have been put forward, focusing the analysis on physical models in which form, function, and materials are examined, with an emphasis on their relationship with the city to gain a comparative understanding of design dynamics and strategies. Following this view, the object of study is broken down into its components, initially yielding a fragmented interpretation that enables an in-depth exploration of its complexity, and then reassembled into a unified vision. The tactile methodology, grounded in models, proves effective at synthesising the complex interactions between the river and the city, offering insights for urban design training. The challenges lie in teaching students how to distil the complexity of urban waterways to develop design solutions that meet a wide range of needs, or how to combine the creative thinking inherent in architectural practice with the scientific mindset required to rigorously test each solution.

A critical and **ecological perspective**, which requires technical and scientific expertise, has been proposed for the development of environmental and sustainable education at multiple levels. From this standpoint, teaching takes place in situ, where the watercourse serves as an open-air laboratory focused primarily on understanding the value of water

resources and their management. This approach also brings to the fore concepts linked to the place's history, where the past and present intertwine with the anthropological dimension. Other ideas suggested by this vision undoubtedly include a multidisciplinary approach to activities, with an emphasis on integrating diverse perspectives and providing specialised skills and knowledge in areas such as environmental protection, river infrastructure, the design of eco-cultural services, and visual communication. A more playful approach is also proposed through board games that combine educational and social elements, fostering a sense of community across all age groups.

The challenge lies in teaching students, during their university studies, the fundamental concepts and tools needed to understand and identify problems, and then giving them the freedom to choose the approach they consider most effective for achieving the desired outcome. The final step is to teach them how to communicate, first by understanding which tools and methods are most appropriate for engaging others, and then for disseminating the results.

The multidisciplinary team's latest perspective stems from **lighting engineering**, an inherently multidisciplinary field that often requires an interdisciplinary approach in both research and education. Within the discipline, students are introduced to the fundamental aspects of working in multicultural teams, and are also taught technical aspects relevant to the discipline, such as public lighting design, lighting technology, human visual adaptation, ecological responses, light control and smart lighting technologies. These systems enable adjustment of the intensity and spectrum of light to suit the environment, thereby reducing energy consumption and the impact on the ecosystem. The need to manage artificial night-time lighting as an environmental factor calls for an integrated approach that combines electrical engineering, ecology, and urban planning. (UNITE!, 2025).

Organisation and collaborative tools adopted

6.2

The project was structured into **three main phases**, with activities starting in December 2024 and concluding in June 2026. The project's structure was organised around three main work packages, supplemented by a phase dedicated to the expected and actual results achieved at its conclusion. The timeline followed a progressive approach.

The first phase involved a general analysis of the team members' perspectives and of the project itself, accompanied by theoretical discussion.

In the second phase, the team expanded its work to include the design and educational experimentation phases through on-site activities; the project concluded with a **phase dedicated to communicating and disseminating the results**.

In the first work package, designed to explore the different pedagogical approaches adopted at the various universities, the activities included preparing introductory presentations, which were shared and discussed within the group. The first online meeting, the kick-off organised in January 2025, also enabled the definition of objectives, roles and coordinators within the organisation, as well as the operational procedures. All the activities carried out under WP1 were set out in a final report summarising the first phase, and the initial results were presented at the UNITE! event in March 2025.

In the second phase of the project, begun in June 2025, the focus shifted to the operational design of the module. The process began with joint activities between teachers and students in person at one of the project's partner universities; during this session, the learning objectives, the course name and structure, the didactic materials, the learning methodologies, and the assessment and feedback tools were discussed and developed. The process was expanded over the course of several months at every stage, culminating in the outline of the module's entire structure – which was titled *Confluences: Interdisciplinary visions for water in cities* – the submission of its application, and the production of a final report containing reflections, critical issues and results that emerged during the workshop and the pilot phase.

The third phase of the project, which began in January 2026 and overlapped with the second phase for two months, was dedicated to disseminating the project's results to the UNITE! community through the organisation of a webinar held in March 2026. During this same phase, the team prepared a presentation on the project's results to be shared with the wider academic community at an international conference in June 2026. Furthermore, the conference proposal involved drafting a potential scientific article, scheduled for submission between late 2026 and early 2027, focusing on the project experience of the Confluences module and its results. In parallel with the WP3 activities linked to the QUORUM project, the module also got underway in April 2026. As a post-project outcome, in addition to the scientific article, the team produced the final project report for presentation to UNITE!.

The team responsible for developing all the work packages, as part of their day-to-day collaboration, adopted a suite of **digital tools** to facilitate communication, content sharing and document management amongst the partners.

In particular, a **Microsoft Teams** account was set up as the main platform for video conferencing, sharing materials, and managing internal messaging within the group. Specifically, institutional documents, presentations, reports, and teaching materials from the partner universities – created using the Office suite – were shared in this space to enable online editing and ensure that the versions were always up to date.

Miro was a tool used by the team as a visual platform to map out concepts and keywords and highlight links between the disciplinary case studies, particularly during the early stages of the project.

As regards group communication, emails were used to share updates between meetings, whilst a **WhatsApp group** was set up for more immediate communications, facilitating a rapid exchange of information amongst team members.

Over the course of several months, the team held **virtual meetings** at a rate of one per month between WP1 and the start of WP2, before increasing the frequency to approximately one meeting every two weeks for the remainder of the project.

The meetings were scheduled and communicated in advance of the deadline for each work package (WP), with the same day and time slot maintained for each cycle. The organisation of the **online meetings** was based on pre-meeting and post-meeting documents, designed to enable each participant to review the materials in advance and arrive at the sessions adequately prepared. Each meeting followed a structured agenda, tailored to the activities in progress. Both **plenary meetings** involving the whole team and meetings dedicated to specific activities were organised; during the latter, the group split into pairs to manage several inter-related tasks in parallel, with discussions on these tasks also shared in the plenary session. These **discussions** were accompanied by periods of collective review, during which comments were transcribed directly into the meeting files or chat logs to record decisions, assumptions, and checks in real time (UNITE!, 2026).

Collaborative dynamics and transferable skills

6.3

Working within a multidisciplinary team brought to light different languages, approaches and working methods; this served as a springboard for translating them into a language that was understandable and accessible, enabling the team to grasp them. Within an international design project, the process was guided by a philosophy of continuous dialogue to foster a progressive exchange of ideas, with the aim of enriching the project. To achieve this, communication – structured around two main dimensions – was fundamental. The first form of communication can be described as ‘technical’, focusing on contributions from each discipline. The architectural practices prioritised an interpretation of urban space focused on morphology and sensory experience; the educational discipline focused on learning and collaborative processes; whilst the technical and scientific disciplines highlighted aspects relating to environmental sustainability, infrastructure management and the use

of technology. This communication took place mainly between the online plenary meetings, which provided opportunities for discussion in which each member could share their disciplinary perspective, thereby broadening our understanding of the issues addressed during the design activities. This multi-perspective approach required continuous effort to clarify the terminology used, the proposed methodologies, and the objectives pursued, so that every team member could understand others’ contributions and integrate them into a shared vision. Within the context of online meetings, one-to-one meetings proved more straightforward to understand, thanks to the exchange of just two points of view. This approach has also fostered greater mutual understanding, enabling each team member to gain a deeper insight into the others’ perspectives and to understand their points of view more accurately. The results demonstrate an effective balance between the two disciplines.

On a smaller scale, in day-to-day communication, the process took the form of exchanging quick messages, sharing document revisions via comments, and having spontaneous discussions during meetings. This second approach required participants to be flexible, willing to adapt and/or integrate their own ideas in light of others’ input, and to engage in problem-solving. In many cases, to cope with this type of communication, information-gathering processes were slowed to make the most of the ideas that emerged and to avoid losing content. These proposals were then discussed and developed in pairs and subsequently shared with the whole team, taking on a more structured and coherent form. The project clearly demonstrated that interdisciplinary collaboration lengthens the discussion process and requires greater attention to internal dynamics, but at the same time has enabled the development of a broader and more comprehensive outcome.

International Mobility Experience at Aalto University (Finland)

During their time at Aalto University, the initial research was conducted on this *site*. This experience provided an opportunity to gain a *deeper understanding* of the urban context relevant to the forthcoming module and to engage with the local *academic community*. This chapter presents the *urban context*, focusing on the role of water and its relationships with the surrounding urban fabric.

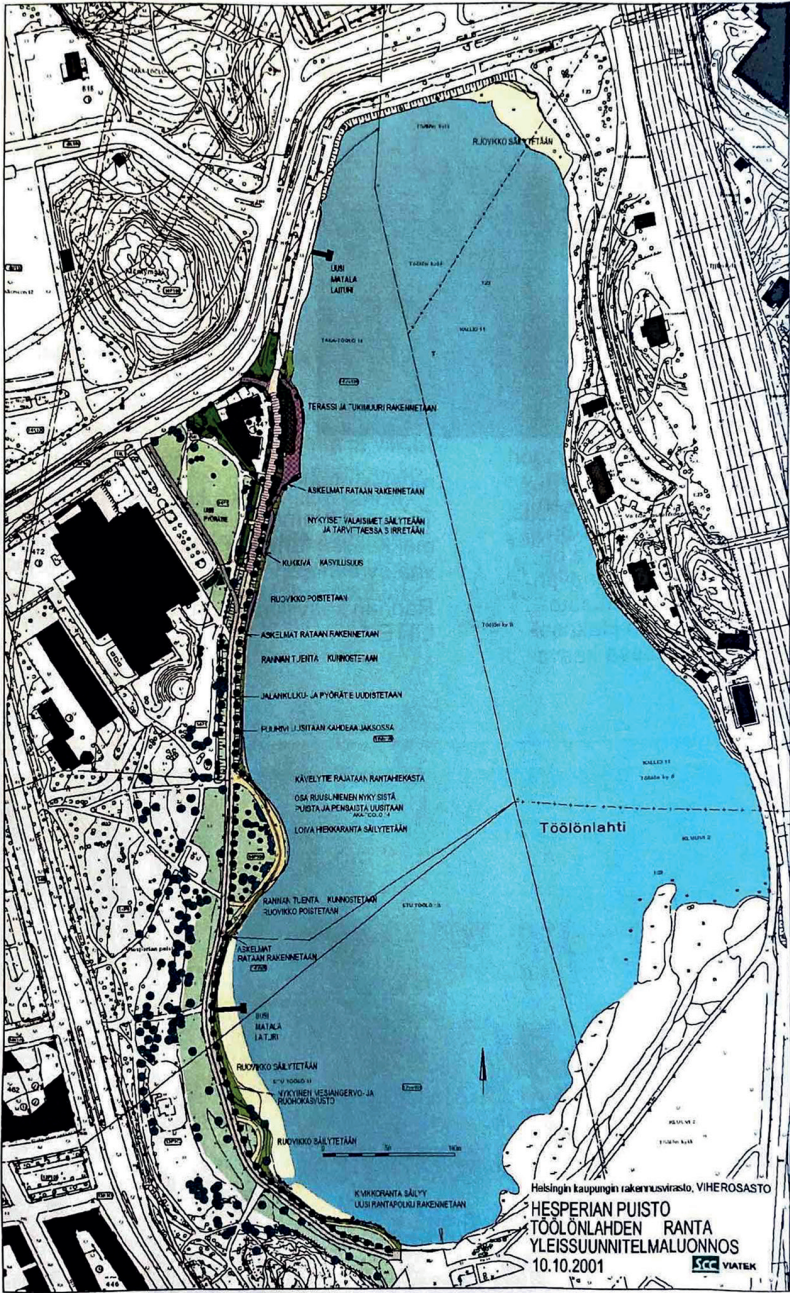
Urban context linked to the presence of water

7.1

As mentioned in Chapter Three, Aalto University acted as coordinator of the QUORUM project; consequently, **Töölönlahti Bay**, situated in the centre of Helsinki, was selected as the subject of study and analysis for the Confluences module. During the week-long on-site session included in the teaching module, which takes place in the Finnish capital, students are required to analyse this context, highlighting its environmental, urban and social characteristics to guide the module's interdisciplinary approach.

During their time at Aalto University, the initial research was conducted on this site. This experience provided an opportunity to gain a deeper understanding of the urban context relevant to the forthcoming module and to engage with the local academic community. This chapter presents the urban context, focusing on the role of water and its relationships with the surrounding urban fabric. The name 'Töölö' derives from the Swedish 'Tölö', referring to the original farming community that occupied the area; the bay served as a natural harbour for small fishing boats and had a wide

opening to the sea, supplying fresh water to the various rural settlements during the 17th century. As the city of Helsinki grew, Töölönlahti Bay began to transform into an expanding urban centre. In the mid-19th century, Finland's first railway line was built, which had a profound impact on the bay. Along the eastern shore, land was reclaimed to create space; railway tracks were laid, and the connection to the sea was altered. During the late 19th and early 20th centuries, the bay became an industrial area: a storage site for timber from Finnish forests and a place where ice was cut for commercial purposes.



KUVA: HESPERIAN PUISTON RANNAN KUNNOSTUKSEN YLEISSUUNNITELMA

Figure 38. Hesperian Puiston Rannan Kunnostuksen Yleissuunnitelma (Töölön Viheraluesuunnitelma, 2001)

The production facilities of the small factories springing up in the surrounding area used the water supply, but unfortunately, the waste they produced began to pollute the area. The water quality began to deteriorate, transforming it into a polluted industrial harbour. During this period, proposals for a new urban development plan began to emerge, a process that lasted 30 years, from 1900 to 1930. There were three proposals: the first involved filling in the bay to create more buildable land; the second focused on officially designating it as an industrial harbour; and the third and final proposal envisaged transforming it into a park with water features. During those same years, a plan by the Finnish architect Eliel Saarinen was put forward, offering an alternative vision for the bay: a cultural centre, monumental buildings, pedestrian promenades and green spaces. This vision was not followed to the letter, but it greatly influenced the site's future development, particularly as a cultural space. After the Second World War, Helsinki underwent extensive reconstruction. The city seized the opportunity presented by hosting the Olympic Games

to initiate restoration of the bay's ecosystem. This period saw the construction of sports facilities and the relocation of factories – and their pollution sources – to the suburbs. From the 1970s through the 1990s, further efforts were made to improve the bay's environmental quality: stormwater management systems were modernised, aeration equipment was installed to increase dissolved oxygen levels, and a monitoring system was established to monitor water quality. Coastal restoration included replanting reed beds, reintroducing native fish species, restoring aquatic plants, and establishing habitats for birds along the shoreline. The bay once again became home to a diverse range of wildlife: swans, ducks, grebes and the occasional seal from the sea (Töölönranta, 2025). From the 1960s onwards, it was a place of cultural renaissance; the architect Alvar Aalto transformed the western shore with Finlandia Hall, defining the bay's new identity centred on art and music; the Opera House and the Finnish National Ballet are also situated there, with Hesperia Park lying between them (Wikipedia-projektin osanottajat, 2005).



Figure 39. View of Töölönlahti and the Töölö District. (Brander Signe, 1908)



Figure 40. View of Töölönlahti and the Töölö District. (Brander Signe, 1908)



Figure 41. Photograph by the author, Töölönlahti bay, 2026.

Finlandia Hall (Finlandia-talo), completed in 1971 by the architect Alvar Aalto, is one of Helsinki's most important attractions. As its name suggests, Finlandia Hall was designed to be a symbolic landmark for the nation. Finlandia-talo welcomes 200,000 visitors a year and has hosted 800 events, including conferences, exhibitions and concerts featuring classical, contemporary and world music, as well as cultural events and dance and ballet performances.

The building draws inspiration from European tradition, reminiscent of Venetian palaces on the canals. The interiors feature many elements typical of its designer, such as asymmetrical forms and natural materials. Finlandia Hall is one of the thirteen sites by Alvar Aalto, known as the Aalto Works, which Finland has nominated for the UNESCO World Heritage List. Inside Finlandia Hall, there are various spaces for visitors: relaxation areas, refreshment facilities and shops selling items from the Aalto collection, traditional Finnish goods and design pieces that reflect the country's identity. There are also high-quality meeting facilities, services and areas for group events (Finlandia Hall, 2026).

The Opera House (Oopperatalo), completed in 1993, had previously housed a sugar factory. The building was designed by Studio Hyvämäki-Karhunen-Parkkinen and welcomes over 250,000 visitors a year, with a total audience reach of 800,000 people. It stages opera and ballet performances, totalling 582 productions, as well as other events, including television and radio broadcasts, school performances, recordings, and live broadcasts.

In terms of staff, it is a medium-sized opera and ballet company. It employs around 550 people each month from over 30 countries. Among them are 53 opera singers in solo and chorus roles, 74 dancers (plus 14 dancers in the Youth Company) and 111 orchestra musicians. In addition, the Opera House employs a wide variety of highly skilled craftspeople, from shoemakers to blacksmiths. In addition to the classics, it stages contemporary opera and dance productions, with a particular focus on Finnish works (Finnish National Opera and Ballet, 2026b).



Figure 42. Photograph by the author, Finlandia Hall, 2026.

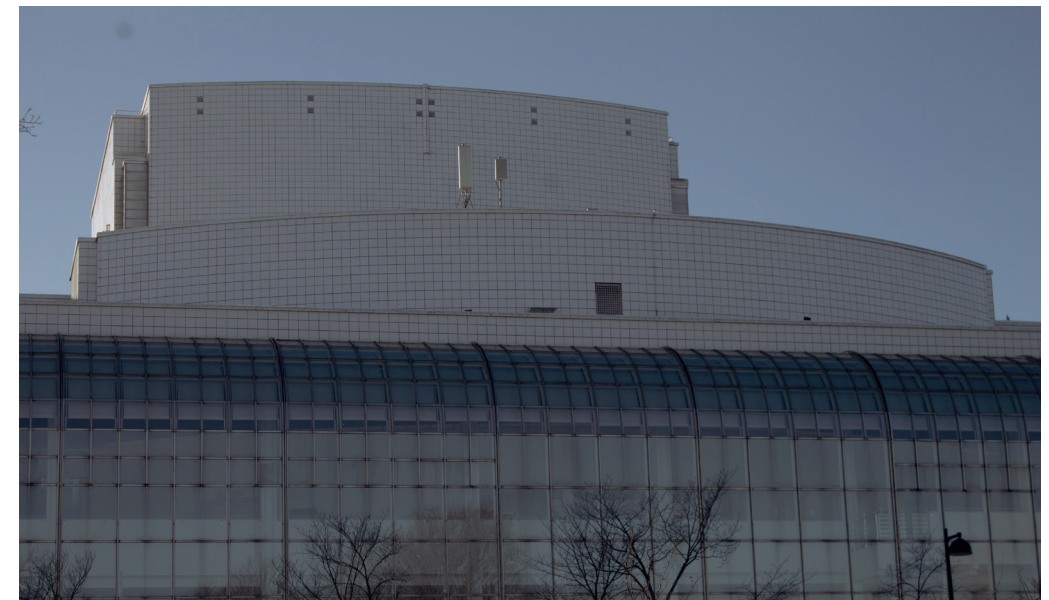


Figure 43. Photograph by the author, The Opera House, 2026.

Hesperia Park and Hesperia Esplanade form a 2.2-kilometre-long green space surrounding Töölönlahti Bay, where factories and private villas once stood. It was once home to a sugar factory, a soap factory, a candle factory, a playing-card factory and a canning factory.

The industrial history of this area is still visible in the tracks left on the lawn by the original railway line. The sugar factory, in particular, polluted the bay to such an extent that it was considered too dangerous for swimming. Nevertheless, the water quality in the bay is improving year on year, as seawater is pumped in from Taivallahti Bay. The aim is to maintain Töölönlahti as a marine bay (MyHelsinki, n.d.). The name Hesperia is linked to the Romantic movement of the early 1800s; “Hesperia was the poetic name used by the ancient Greeks to describe the mythical lands far to the west. Hesperos refers to the evening star and, in Greek mythology, the Hesperides were nymphs who tended an enchanted garden in a remote corner of the world”. Among the species of shrubs found here are wild apple trees, cherry trees, alders, oaks, poplars, elms, maples, birches, horse chestnuts, ash trees, lime trees and sweet cherry trees. A rare ‘Katherine Havemeyer’ lilac was also found in the park; at one time, a wide variety of lilacs grew there, until the city’s wild rabbits destroyed some of them in 2008 and 2009. Since then, new saplings have been planted, and the park’s shrubs have been protected by a metal fence (Vihreät Sylit, n.d.).

The relationship between architecture, culture and the bay continues with the **Finnish Parliament** building, an example of 1920s classicism comprising 200 seats (MyHelsinki, n.d.), and with the **Museum of Contemporary Art**. The museum, known as ‘**Kiasma**’, houses around 8,800 works; these are the subjects of research and academic publications that explore their cultural and historical significance in depth.

The collections are acquired from exhibitions and art galleries, directly from artists, or commissioned. They are loaned to other institutions to promote their wider dissemination and are also made available online. The architecture follows contemporary museum design principles. The five levels on which the design is based are influenced by the concept of ‘intersection’ (from the Greek chiasma) and are connected by ramps and pathways that guide visitors. The element of the cross is used to symbolise the intersection of nerves and the way chromosomes intertwine; it is no coincidence that the building was designed with a strong focus on the human scale, with proportions attuned to the body’s perceptual experience of space. In terms of materials, Kiasma combines zinc, aluminium, brass, glass, concrete, wood and water, creating a variety of surfaces and atmospheres that reinforce the relationship between architecture and sensory perception. The space is also influenced by natural light streaming into the building, which varies with the seasons (this was managed during construction and is balanced by artificial lighting). Kiasma also features a theatre dedicated to contemporary performing arts, hosting performances, films and installations related to the museum’s exhibitions. It also offers exhibitions suitable for different age groups, as well as activities and services aimed at children and families (Finnish National Gallery, 2026).

The bay is also home to Helsinki's musical heart: **'Musiikkitalo'** (Töölönraita, 2025), which hosts 1,000 concerts and events a year, is the home of the Helsinki Symphony Orchestra, the Radio Symphony Orchestra and the Sibelius Academy.

Continuing with the theme of culture linked to books and information, the Töölönlahti area is home to 'The Newspaper House': **'Helsingin Sanomat'** (Helsingin Sanomat, n.d.), which publishes the eponymous daily newspaper – the most widely read in the Nordic countries – and **'Ilta-Sanomat'**, Finland's leading media outlet.

The Helsinki Central Library: **'Oodi'**, situated within Kansalaistori Square – a space for events, public celebrations or simply for residents to relax (MyHelsinki, n.d.) – is one of the most significant examples of contemporary Finnish architecture. Completed in December 2018, it was designed by ALA Architects.

Since its opening in 2011, it has become a major cultural hub, hosting hundreds of events. These include classics such as concerts, organ recitals, theatre and musical performances, as well as family occurrences, auditions, and institutional and cultural events (Musiikkitalo, 2025).

Their portfolio includes 11 local newspapers and a city daily. The print runs they can handle range from 1,000 to 2,000,000 copies. The printed products are made from renewable and recyclable materials. Over 90 per cent of the waste generated during production is recycled, whilst the remainder is sent for recovery (Sanoma, n.d.).

The original concept for the library's exterior was inspired by Töölönlahti Bay; the aim was to integrate the library into a visual continuum, whilst simultaneously creating new connections in various directions (Oodi, 2026). The Töölönlahti neighbourhood had often been the focus of attention even before the library was built. It embodied the many hopes associated with public urban spaces open to all. "After all, urban space is also a kind of visual forum, a place of lively dialogue: just as markets and agoras have always been. If an urban environment were regarded as a social media platform, might it encourage people to communicate more with strangers in real life and face-to-face?" asks Elissa Eriksson, a

member of the street art group Multicoloured Dreams. In 2011, Eriksson completed her campaign *Haluan nähdä muutakin* (I Want to See More) (Evermadeadm & Evermadeadm, 2014). Today, Oodi welcomes around 9,000 visitors a day and is open seven days a week. The library was designed as a space accessible to all, open to the public and free of charge. In terms of architecture and materials, spruce wood once again appears on the façade, combined with glass and steel. Oodi is spread over three floors.



Figure 44. Photograph by the author, Oodi, 2026.

The ground floor comprises the main entrance, a multi-purpose area housing a café, event spaces, an information desk, and the library.

The second floor houses the Urban Workshop – a vibrant hub for creativity and hands-on activities. Here, visitors have access to a wide range of facilities: meeting rooms, recording and photography studios, gaming zones, and a host of innovative tools, including 3D printers, laser cutters, UV and large-format printers, professional multimedia workstations, and sewing machines. Dedicated spaces for group cooking and a diverse selection of loanable equipment further support collaborative projects. All equipment can be reserved via the City of Helsinki's Varaamo platform, which provides detailed information on opening hours, booking requirements, available materials, and whether a valid library card is required. Equipment use is free, but material costs may apply. For each item, Varaamo also provides clear, accessible user guides, allowing visitors to prepare in advance.

The third floor is the quietest and most relaxed area, dedicated to reading in lounge spaces and featuring a panoramic terrace overlooking the bay and the cityscape. The library houses around 100,000 items available for loan in nearly 20 languages and is part of the Helmet library network, which provides access to over 3 million items. The main languages are Finnish, Swedish and English; there is also a small collection of books for adults and children in all three Sámi languages spoken in Finland: Northern Sámi, Inari Sámi and Skolt Sámi. Northern Sámi is the most widely represented language in the collection. Other books in foreign languages are available at the Multilingual Library at Helsinki's main library in Pasila. The multilingual collection includes books for children, young people and adults in over 80 languages. Most of the material is on the third floor of Book Heaven, whilst on the first floor you can buy bestsellers and paperbacks with a short loan period. Oodi houses an extensive collection of sheet music, comics, console and board games, as well as lite-

rature and films focusing on sexual and gender minorities. Newspapers and magazines are available at Book Heaven, along with tablets providing access to digital regional newspapers and thousands of foreign newspapers. The reservation-only shelves are on the third floor, and self-service points are available on the first and third floors of Oodi. These provide assistance with independent research and advice on using the databases. If the material you require is not available in libraries in the Helsinki metropolitan area, you can request an inter-library loan. Oodi is a house of literature, and this is also reflected in its programme of events. Throughout the year, various literary events and book clubs are organised, open to everyone, including those designed for young children. Examples include book clubs, chess clubs, language cafés, cultural gatherings, digital support for older people, and the Baby Library (Oodi, 2026).



Figure 45. Photograph by the author, Oodi, 2026.

The section on information culture concludes with the General Post Office: **'Postitalo'**, situated on the edge of the bay (Töölönlahden Sanomat, n.d.). Helsinki's central post office, completed in 1938, previously housed only postal and telegraph services, and it was one of the most prominent and significant public building projects in the capital of independent Finland, alongside the Parliament House, completed in 1933, and the stadium built for the 1940 Olympic Games.

The building underwent a number of alterations from the 1930s to the 1970s, including the desire for larger, centralised spaces. Its proximity to the railway station, which was strategic for the transport of mail, the use of modern techniques and innovative materials for the time, the use of mechanisation for mail sorting, and the rational organisation of spaces between the post office, telegraph and telephone services, technical facilities and staff areas such as flats and the canteen. In the 1950s, the building was extended with the addition of a further storey to the central wing, and Helsinki's first helipad was built on the roof, which was used during the 1952 Olympic Games. During the war years, the roof of the Central Post Office housed the air defence units. Today, the building is home to both large corporations and rapidly growing companies, offering flexible spaces that make the most of modern technology. Unlike traditional historic buildings, which close their doors when their purpose changes, the Postitalo – whilst remaining part of Helsinki's urban identity – instead points the way towards an open city. A listed historic building is being adapted with respect and ambition to meet the needs of the latest generation of creative minds.

The bay, situated in the heart of Helsinki, is a key hub for city traffic. To the east of the railway lies the **Kallio district**, known for its relaxed, lively and creative atmosphere. Full of restaurants, cafés and shops, it is popular with young professionals and students (MyHelsinki, n.d.).

Among the city's landmarks are the Tokoinranta green space, Karhupuisto Park and the bays of Eläintarhanlahti and Kaisaniemenlahti. What is now Eläintarhanlahti was originally part of Töölönlahti; it is now separated by a railway embankment (Wikipedia-projektin osanottajat, 2017).

Rautatieasema railway station was designed by the architect Eliel Saarinen in the early 1900s; it serves 250,000 passengers a day, with around 850 local trains and over 100 national long-distance trains passing through.

Several new office and residential buildings have been constructed alongside the main railway line (Wikipedia-projektin osanottajat, 2005). These include, for example, the Holiday Inn hotel chain and the **UPM** headquarters, completed in 2013, which houses around 450 employees.

The area also features the **KPMG** headquarters (Töölönlahden Sanomat, n.d.) and the Alma-Talo offices – home to publishers, newsrooms, and various media operations – both designed by JKMM Architects. KPMG's approach to architecture places a strong emphasis on social responsibility, envisioning buildings as "infrastructure for happiness." This philosophy sees architecture as an active contributor to collective well-being and urban quality of life.

It is a major transport hub for the city, connected to the underground, trams, buses, cycle paths, taxis and city car parks. Inside, it offers a range of facilities including cafés, restaurants, pharmacies and shops. Furthermore, it follows a sustainability-focused programme that promotes low-emission transport, reduces energy and water consumption, and minimises the building's carbon footprint; it also prioritises safety and accessibility whilst preserving the station's historical and cultural heritage.

The building, known as Biofore House, is considered one of the most successful new buildings in central Helsinki and was designed by the architectural firm Helin & Co. Biofore's architecture emphasises the forest and wood, making use of local materials and expertise; this choice fully reflects the company's identity, which focuses on the use of renewable materials. The company's workspaces are flexible and designed with staff wellbeing in mind. Spacious areas have been created for team meetings, as well as private spaces such as telephone booths to ensure privacy (YIT, n.d.).

KPMG believes that a sustainable, thriving society depends on integrating technological innovation, economic stability, social equity, and universal access to culture, knowledge, and well-being. Their guiding principle, 'Happiness > Culture + Knowledge + Well-being,' reflects values promoted by the United Nations and WWF. (JKMM, 2026).

Focusing on the location of the bay itself and the **network of paths** it offers, a 2.2-kilometre-long footpath and cycle route was created in the 2000s (Wikipedia-projektin osanottajat, 2005), and in 2010, it underwent a complete refurbishment with uniform surfacing and lighting.

Töölönlahdenpuisto Park forms the principal green space surrounding the bays of Töölönlahti and Eläintarhanlahti in the Kallio district, east of the bay. Spanning 8.8 hectares, it is bordered by several cultural venues and serves as a new oasis for city events and leisure along the southern shore. The roots of the park's green spaces stretch back to the 19th century, to the first villas and the founding of the Töölö Park Society. Early 20th-century plans proposed transforming these areas into public spaces dedicated to sport and well-being. The aim was to create a network of parks linked by coastal footpaths, establishing a public recreational haven accessible to the local working-class population. As described in a contemporary newspaper: "Workers need less refined recreational areas, where they can eat their packed lunches without fear, get a bit messy with eggshells and dance without attracting too large a crowd" (MyHelsinki, n.d.). Over time, the park has been renovated to meet the evolving needs of the public, and many of the key buildings that define its character today have been constructed.

This marked the beginning of life around the bay, with Töölönlahti becoming a natural meeting place. The flat terrain, routes, and views of the water make it a favourite spot for runners today. Over time, informal running groups began to form, giving rise to traditions that endure today, including charity races, corporate runs, Finnish championship events, and night runs (Töölönranta, 2025).

The park underwent significant refurbishment for the 1940 Summer Olympics, and in the 1990s, the footpath was extended, creating separate lanes for pedestrians and cyclists. Today, efforts focus on enhancing riverbank facilities and renovating the willow-lined avenues, with the primary aim of preserving the park's key features and natural value. Plans for the park's ongoing improvement began in autumn 2023 and include both immediate and long-term interventions. Current projects involve renovating the Hesperia esplanade, designing an outdoor gym, establishing a nature reserve and green space in Töölönlahti as part of a municipal initiative, and restoring Finlandia Hall. Across the railway, redevelopment has begun in Kaisaniemenpuisto Park, intended to transform it into a welcoming venue for events, while the Kaisantunneli tunnel now connects the two parks.



Figure 46. Photograph by the author, Töölönlahdenpuisto Park, 2026.

A defining feature of the park is its variety of water elements, including a large basin in front of Finlandia Hall. Residential buildings facing the park are complemented by *'pocket gardens'*—small, distinctive green spaces at the eastern end. The park itself is home to 21 tree species and 25 shrub species, with flowerbeds of perennials and ornamental grasses, totalling 32 plant species. Thousands of bulbs and 40 large saplings have recently been planted. The play area is specifically designed for exercise, featuring an obstacle course of ropes and nets, large climbing cubes, cushioned mats, fitness stations for adults, and seating areas. Additional amenities include a stage for events, portable kiosks, barbecue areas, and dedicated spaces for relaxation.

As part of the design process, surveys and workshops with residents, local businesses, and associations were conducted in early 2024, allowing the community to contribute ideas and feedback on the concept and plan (City of Helsinki, 2026). The park's main goals are to safeguard nature and expand green spaces, improve well-being and recreational opportunities, position the park as a year-round highlight for Helsinki, and strengthen its identity as a venue for experiences and events. Achieving these goals relies on balancing nature, vegetation, and human activity to maintain the area's livability and water features. Preserving the city's façade is equally important, fostering a distinct identity that showcases both the urban landscape and the surrounding natural environment. Ultimately, the park is envisioned as a place for diverse experiences—where residents can enjoy events, recreation, relaxation, and sports (City of Helsinki, n.d.).

The comments received fall into three categories: the first focuses on the park itself and the cultural value it preserves. Citizens, with 126 responses, would like a park that can be enjoyed year-round, with particular attention to protecting the natural landscape. Another recurring theme is improving existing facilities through the regeneration of certain sites and the maintenance of green spaces. The second category centres on the number of trees present; residents suggest more shaded areas, flower-filled meadows and natural habitats. Furthermore, the public would like to make the most of these spaces to enjoy outdoor picnics and summer or winter walks in nature. Another set of comments emphasises the importance of preserving the area's historical and landscape value, suggesting that paths be improved without hindering pedestrian access.

Alongside the construction of the park, the coastal strip at the southern end of Töölönlahti was also renovated. In the past, the *coastline* had been eroded, and the kerb along the shore acts as an erosion barrier.

As regards *water quality*, the industrial plants in Hesperianpuisto in the 19th century severely polluted Töölönlahti, and the bay's seabed still contains layers of sediment dating from that period.

Next to the kerb is a small sandy beach with a floating jetty providing access to the water. Visitors can hire equipment for paddling, rowing or stand-up paddleboarding. At the water's edge, they can admire the waterbirds that live in the bay, such as mallards, whooper swans, wigeons, great crested grebes, Canada geese, white-fronted geese and Eurasian coots.

At the end of 2005, a project was carried out to channel water from Humallahti to Töölönlahti to improve the quality of the water. During the open-water season, water was channelled from Humallahti, resulting in a significant increase in water exchange. The greatest effects of this water exchange were observed in the early years, with a marked reduction in nutrient and algae levels in the water. Since those early years, water quality has remained above baseline, with only slight variations. The water is currently suitable for bathing. (City of Helsinki, 2026).



Figure 47. Pocket Gardens in Töölönlahdenpuisto Park. (City of Helsinki, n.d.)

Töölönlahti Bay, located in the heart of Helsinki, measures 650 metres in length, 200–300 metres in width, and reaches a depth of up to 2 metres. It is connected to the Baltic Sea by a narrow channel (Aalto University Learning Centre, n.d.). The history of contamination in the bay stretches back to the 19th century, a period when Helsinki was expanding, and the bay's shores were lined with fields, farms, and meadows. Early signs of pollution became apparent in the form of foul odours and direct waste discharges into the water. As a result, the bay's water stagnated, dense algal blooms developed, and hydrogen sulphide was detected.

By the early 20th century, scientific studies were underway to analyse the bay's condition through regular sampling and a combination of chemical and physical tests. Researchers identified phytoplankton and species typical of eutrophic waters, and investigated nutrient release from the sediment. These findings led to Töölönlahti being classified as one of the city's most polluted sites. Responding to pressure from local residents, efforts to restore the bay began. Proposed solutions included diluting the bay with clean water, using drinking water, and reducing nutrient concentrations. Two sewage treatment plants were constructed five years apart to treat the wastewater. Progress in improving water quality was slow, primarily due to limited water exchange and persistent nutrient accumulation in the sediment. However, work continued into the 1990s, when an extension of the sewerage network brought further improvements. Other proposals included introducing seawater from nearby bays or the outer archipelago and recirculating it via chemical treatment plants and drainage systems. Introducing seawater proved more economically viable and, from an ecological standpoint, avoided the excessive water clarification associated with freshwater. Consequently, the project proceeded with the introduction of seawater via an existing tunnel from Taivallahti to Töölönlahti and the construction of containment structures. Launched in the early 2000s, the project encompassed water abstraction and discharge,

weekly monitoring of water and sediments, and the use of instruments to measure various chemical, physical, and biological parameters—including pH, oxygen, nitrogen, phosphates, salinity, temperature, transparency, fluorescence, turbidity, chlorophyll in algae, phytoplankton, zooplankton, and benthos. The use of mains water was kept to a minimum and reserved only for summer supplementation, with clear recommendations provided for bathing in the bay.

The findings for the bay were as follows: the **water temperature** was highest in July, exceeding 20 °C; the bay's water was classified as brackish, with a slightly basic pH and very high turbidity.

The **macrofauna**, on the other hand, consisted of chironomid larvae, oligochaetes, crustaceans and molluscs. As regards **aquatic vegetation**, the bay's shores have been identified as partly natural, surrounded by reed beds, with few benthic microalgae, and devoid of submerged plants due to turbidity. Between 2000 and 2003, the bay's water quality was classified as poor, suitable only for recreational activities that did not require purity or transparency.

Dissolved oxygen levels were sufficient during the summer but deficient in winter, whilst phosphorus levels were high for most of the year. Algal biomass peaked in spring, consisting of diatoms and small flagellated algae. The presence of zooplankton was indicated by the presence of rotifers and cladocerans.

With the launch of the 2005 restoration project, which involved introducing water to improve water quality and increase water exchange, there were good prospects for reducing accumulated phytoplankton biomass. Consequently, water turbidity would have decreased, as would the oxygen problems (Helsingin kaupungin ympäristökeskus, 2003). In the years that followed, oxygen depletion increased, mainly due to phytoplankton, but the situation appears to have stabilised; the water has become clearer, allowing for a better view of the seabed. Phosphorus and nitrogen concentrations have decreased, and water quality has been found to be excellent (Munne et al., 2008).

At present, the **water temperature varies** rapidly depending on the season, due to the bay's small size and shallow depth.

On the eastern shore of the bay, **cultural and natural elements** overlap and alternate, blending into the setting already described and reinforcing the ongoing narrative of balance among the urban environment, nature, and culture. In this area, which offers a view of the bay from above, there are **villas** that are home to figures from the cultural world or have been converted into cafés. In the 1880s, the city began leasing land for the construction of villas in Eläintarha, and over the following two decades, 15 were completed.

In spring, the water temperature hovers around 5–8 °C. In early summer, the water warms to 13–17 °C and, in July, can reach 18–22 °C. By October, the water temperature drops below 10 °C and the bay usually freezes over by the end of November. Swimming is not officially permitted due to the water quality and the bay's urban location; however, the area is a popular outdoor recreation spot, frequented for walking, rowing and birdwatching (SeaTemperature.net, n.d.).

The villas have had a history as eventful as their reputation. They have been described as professors' villas, rented barracks, shanty towns and architectural gems. Seven of the villas have been demolished, whilst the remaining ones are situated right on the edge of the path that runs alongside the railway line.

The original industrial buildings, which had long polluted the bay, were demolished. Today, some villas, such as Villa Hakasalmi, house museum spaces with temporary exhibitions; Villa Kivi: the Writers' House is a centre for authors and writers' associations located in the centre of Helsinki. Villa Kivi has a ballroom and 14 writers' studios, as well as three guest rooms for artists visiting Helsinki as part of the residency programme. The ballroom is available for hire for weddings, confirmations, thesis presentations, graduation ceremonies, family reunions, birthdays or other celebrations. In addition, the sauna for ten people located in the annexe is available for hire (Villa Kivi, n.d.). Villa Haka-

salmi is situated next to Finlandia Hall; its most famous resident was Aurora Karamzin, a celebrated local beauty remembered as a major benefactor of Helsinki. Among the services set up on Aurora's initiative were a soup kitchen for the poor, a nursery for farm labourers' children, a children's home and a shelter for girls from the countryside. In 1867, Aurora also founded the Institute of Deaconesses, which began its work during the famine that severely strained the country's resources. Today, the villa houses the Civic Museum, which preserves some artefacts from Aurora's life (Villa Hakasalmi, 2015). The villas converted into cafés or restaurants serving local sweet specialities include the Art Café, the Blue Villa Café and the Hostel Café Huvila.



Figure 48. Photograph by the author, Villas, 2026.

As you come to the end of your stroll amongst the villas, you'll catch sight of the **Winter Garden**, which opened to the public in 1893. With over 120 years of history as a place for locals to relax and socialise, it welcomes 100,000 visitors every year for free. The Winter Garden comprises the greenhouses of the City Garden and the **Rose Garden**, featuring around 3,000 roses that can be admired during the season. Architecturally, the Winter Garden was designed by Gustaf Nyström, who drew inspiration from London's Crystal Palace of 1851, which pioneered the trend for steel-framed pavilions and greenhouses.

Among the rare plants in the Winter Garden is a camellia that was moved from Aurora Karamzin's villa. In the late 19th century, the Garden was home to conifers, myrtles, laurels, tropical plants, and a collection of cacti comprising around 100 species and varieties, for a total of approximately 2,600 plants. The Winter Garden reopened to the public on 9 February 2012 following a period of renovation and now houses over 200 different plants, mainly from the Mediterranean region. The plants were chosen for their aesthetic appeal and historical interest, rather than for scientific reasons. The Palm House is home not only to palm trees but also to island pines and the sole remaining camellia, believed to be one of the oldest in Finland. The west wing is home to dwarf palms, a cycad and a magnificent *Magnolia grandiflora*. The cactus room is dedicated to succulents. Around Christmas, azaleas, tulips, amaryllis, hyacinths and lilies of the valley are all in bloom, whilst Easter is the season for daffodils and tulips. The rose garden opposite the Winter Garden was designed by the city gardener Svante Olsson and laid out in 1924. It is at its best in summer, around July, and the roses can continue to bloom until late autumn. In total, the garden is home to around 3,000 roses. The City Garden, behind the Winter Garden, comprises six heated greenhouses and 16 polytunnels. The greenhouses are used to force the growth of 45,000 tulips and other bulbs and to supply 140,000 bulbs for spring planting. Every year, around 200,000 summer flowers are grown for the city's flowerbeds and for special occasions and official city events; there are 30 laurel and palm trees (City of Helsinki, n.d.).



Figure 49. Photograph by the author, Winter Garden, 2026.

Continuing to explore the **bay's natural ecosystem**, Töölönlahti is home to a diverse range of resident bird species: mallards, tufted ducks, coots and mute swans; as well as seasonal visitors: goldeneyes (winter), common mergansers (spring/autumn migration) and common gulls (summer). As for fish populations, recent surveys have recorded: perch (abundant), roach (common), pike (occasional) and ruffe (small populations).

Although the bay is not a fishing destination, the presence of fish indicates improved water quality. In spring, waterbirds arrive and establish their territories, whilst the reeds begin to turn green; in summer, there is a peak in algal growth (which sometimes affects water clarity), peak bird activity with nesting and chicks, and maximum water temperatures (16–20 °C). In autumn, migratory birds stop to rest and feed, and visibility in the water is often better. In winter, the bay freezes over from January to March; in some winters, it is possible to go ice skating, skiing and walking, and the trail is maintained to keep the running route clear (Töölönrinta, 2025).



Figure 50. Photograph by the author, Töölönlahti Bay, 2026.

As the description indicates, **the bay is a hub of cultural and architectural activity**, safeguarding cultural heritage and preserving nature; it seeks to present itself as an element that blends seamlessly into the urban-natural fabric. In a forward-looking **vision set for 2050**, a study is conducted on the Pro Helsingfors urban plan, established in 1918 by Eliel Saarinen and Bertel Jung, which covers the entire city of Helsinki. This study also focuses on Töölönlahti Bay, as the two pioneers behind the plan regarded the bay's reclamation as the only way to enable the expansion of a compact city centre.

The vision for the future is therefore based on seven key themes, which are: Urban Helsinki, a city of sustainable mobility; Maritime Helsinki, a city of economic growth and jobs; a city of urban nature and cultural environment; Helsinki as part of the region and on the international stage; and a city offering an attractive place to live (Virta, 2019). Some recent examples specifically include: with regard to climate, rising sea levels and increased rainfall require enhanced rainwater management, flood protection for surrounding buildings, planning for ecosystem resilience, and continuous monitoring of water quality. In terms of accessibility, the aim is to improve tactile paving for visually impaired users, add access points from the surrounding neighbourhoods, improve connections to public transport, and enhance signage and wayfinding. Environmental improvements continue with the creation of an additional reed bed, the introduction of native plant species, underwater structures to provide fish habitats, and nesting platforms for birds. The bay's role as a community hub is constantly growing, with more structured events such as educational programmes on the ecosystem and its history, collaborations with cultural institutions, and integration with Helsinki's plans for a carbon-neutral city (Töölönrinta, 2025).

The academic and cultural environment at Aalto University

7.2

Another key aspect of my time at **Aalto University** was analysing and understanding the university's academic and cultural context to design the teaching module, particularly regarding how it educates its students and promotes internationalisation and interdisciplinarity. Specifically, we explored the departments involved in delivering the interdisciplinary programme and the strength of the university's international dimension. We examined campus life and student support from various angles, including support for international students, community support initiatives, and the balance between study, leisure, and personal well-being.

Aalto University was established on 1 January 2010 following the merger of the Helsinki City University of Economics, Technology, and Art and Design. Today, Aalto University comprises six faculties with 12,000 full-time students and 4,000 academic and administrative staff, including nearly 400 professors. The idea behind the merger was to bring together science, technology, design, art, economics and business to create a new, innovative academic hub to shape a sustainable future, establishing a campus as a centre for world-class collaboration (Aalto University, 2026). The campus is situated in the heart of Otaniemi, surrounded by greenery and built in the 1950s, with an urban plan designed by

Alvar Aalto and other renowned Finnish architects, such as Reima and Raili Pietilä and Heikki and Kaija Sirén. Alvar Aalto's work was characterised by an open and creative approach to research. When faced with problems, he sought unconventional solutions, and now the University itself is committed to doing the same: breaking down the traditional boundaries between the sciences and the arts to generate systemic solutions that accelerate innovation (Aalto University, 2021). The facilities on the Aalto University campus have been organised by research area to best facilitate multidisciplinary collaboration (Aalto University, 2019). The academic organisation is based on the following schools:

School of Arts, Design and Architecture, specialising in architecture, art, design, media, film and set design; **School of Business**, focusing on economics, management, marketing and service management;

School of Chemical Engineering, specialising in biomaterials, biosystems, chemistry and metallurgical engineering; **School of Electrical Engineering**, specialising in electronics, communications, automation and acoustics; **School of Engineering**, covering civil, mechanical and built environment engineering;

School of Science, comprising applied physics, computer science, mathematics, neuroscience and biomedical engineering (Aalto University, 2026). The core values that guide the University in this endeavour are:

Responsibility: Working towards a better world, acting sustainably for the well-being of all;

Courage: Tackling challenges with agility, creativity and passion, aiming high;

Collaboration: Diversity is part of what the University is about and fosters a strong community (Aalto University, n.d.).

Adopting a circular approach, the University seeks to create a people-centred living environment and advanced energy solutions, without neglecting health and wellbeing. This is made possible by bringing together knowledge of global economic dynamics, technology, sustainability and design. It is clear that the six dynamic schools work together to develop a diverse academic programme for students and, in the long term, to generate impact centred on innovative solutions that tackle global challenges, thereby shaping a sustainable future.

To emphasise interdisciplinary aspects at an institutional level, Aalto University officially recognises three multidisciplinary Master's programmes as part of its strategy for joint learning. These are the three programmes co-run by several schools (Arts, Business, Science, Engineering and Chemical Engineering).

The Master's in International Design Business Management (IDBM) is organised jointly by all six of Aalto's faculties and coordinated by the Faculty of Economics. The IDBM programme trains students with backgrounds in art, economics and engineering to enhance their businesses through meaningful creation and design, offering a strategic vision of design-based business management. Graduates of the IDBM programme will be able to drive innovation. During a six-month real-world industrial project, students explore and develop groundbreaking product, service and business concepts. The projects are supervised by lecturers from various disciplines and expert industry tutors.

The **Master's in Creative Sustainability (CS)** is coordinated by the Faculty of Arts, Design and Architecture. Creative Sustainability is a joint Master's programme offered by the School of Arts, Design and Architecture, the School of Business and the School of Chemical Engineering. Established in 2010, the CS programme brings together students from different disciplines to study and work in teams using an interdisciplinary approach, creating new sustainable solutions for human, urban, industrial and business environments.

The **pedagogical approach** is based on the integration of teaching and research, problem-based learning, design thinking, blended learning and strong links to practical outcomes. Graduates of the programme are committed to understanding and addressing systemic phenomena and complex problems. Computer Science students can obtain a Master of Arts, a Master of Science in Technology or a Master of Science in Economics.

The **Master's in Urban Studies and Planning (USP)** is organised jointly by the Faculty of Arts, Design and Architecture and the Faculty of Engineering. The programme is coordinated by the Faculty of Arts,

Design and Architecture. The Master's programme prepares students to excel as professionals capable of understanding and addressing complex issues in urban development. Students learn to address these challenges through a curriculum and pedagogical approach that combines interdisciplinary breadth with in-depth knowledge in key areas of theory, skills and practice. The programme began in autumn 2017 as a joint offering of the University of Helsinki and Aalto University (Aalto University, n.d.).

Within this academic structure, students play an important role because the learning approach is student-centred. All master's degree programmes are taught in English, as are some bachelor's degree programmes. In addition, there are Finnish language courses, as well as courses in interdisciplinary design and entrepreneurship. In terms of university life, students are entitled to a range of benefits, including discounts at restaurants and canteens, affordable public transport, access to sports and healthcare services, and student accommodation. At the start of each semester, a presentation is organised for international and exchange students, during which the main practical aspects of life in Finland are explained, including: immigration procedures, accommodation, healthcare, banking services, transport with details of the main routes and stops, safety, campus services available via a dedicated app, discounted meals for students, reuse and sharing initiatives available on campus, as well as job and internship opportunities. In addition, the Aalto University Student Union (AYY) and many other student organisations offer members a diverse student culture and foster dynamic campus life (Aalto University, n.d.).



Figure 51. Research and Art: Focus of Development – Driving Excellence. (Aalto University, n.d.)

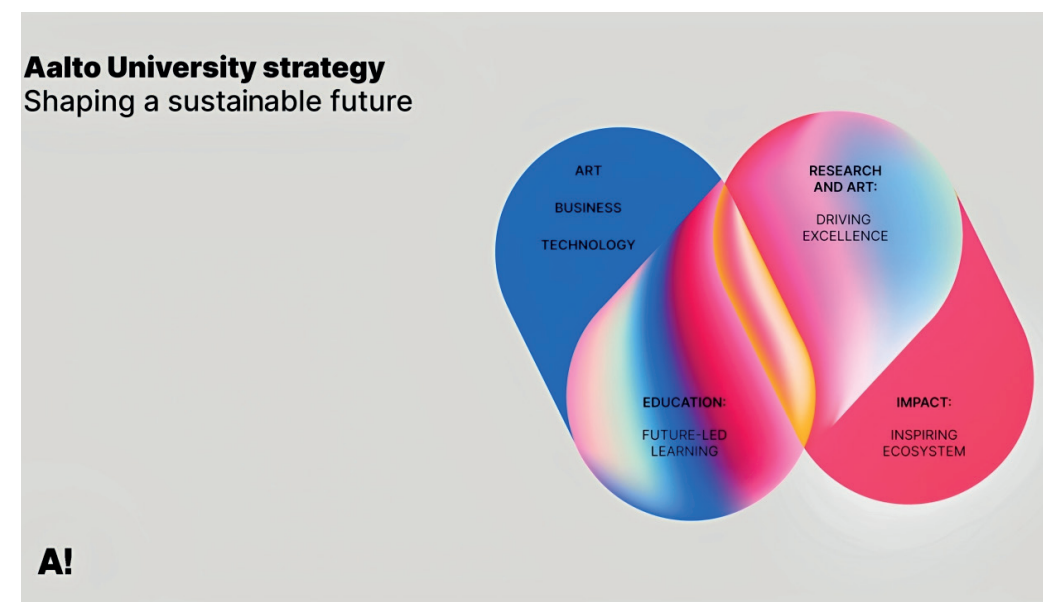


Figure 52. Aalto University strategy. (Aalto University, n.d.).

Pedagogical approach and organisation of teaching 7.3

The *pedagogical approach and organisation of teaching* were explored at Aalto University through interviews with lecturers and students.

To proceed with the interviews, the University required submission of a research authorisation application and completion of documentation related to ethical considerations and the protection of personal data, including the Privacy Notice, the Informed Consent Form, and the Participant Information Sheet.

The research involved face-to-face and remote interviews with lecturers and students taking part in three interdisciplinary Master's programmes. The qualitative and quantitative data collected on international experience were used to develop the Confluences module to better understand the benefits and challenges of interdisciplinary learning. In this way, the results were not only validated against the literature presented in WP1,

but also helped to enrich and update it.

Specifically, this involved identifying the challenges and successes in the design of academic programmes, course planning, the selection of ILOs, teaching methods, learning activities and assessment. The aim was not to focus on specific topics covered in the courses, but to highlight the organisation of teaching itself, as well as the perspectives, emotions and attitudes of those involved, namely lecturers and students.



Figure 53. Photograph by the author, Aalto University, 2026.

These topics were used to pose queries to students and lecturers. The questions drew on the concepts and themes of WP2, which had been discussed during the workshop at the Polytechnic University of Turin. In this way, the proposed ideas were reviewed and enriched by different perspectives that emerged in a different context. The professors involved in the research were from three interdisciplinary Master's programmes at Aalto University: International Design Business Management, Creative Sustainability, and Urban Studies and Planning. Among the academic figures and roles involved were professors and associates, directors and heads of master's programmes and research groups, and experts in pedagogy and educational development. Together, they contribute to an educational programme that combines research, project-based learning, participation, sustainability and pedagogical innovation. The lecturers were contacted by email to arrange a meeting, and each was provided in advance with details of the interview, which lasted approximately one hour each, including information about the project, the objectives of the interview itself and its technical aspects (recording and transcription were carried out subject to the interviewee's approval).

The questionnaire posed to the teachers was as follows:

1. How would you describe your approach in your programme/course?

Interdisciplinarity and multiculturalism

2. What elements make your approach unique in this regard?

3. How is the cultural and international diversity of students integrated into teaching and learning?

4. Do you follow group or individual learning, or a combination of both?

5a. Do you emphasise a mix of disciplines?

5b. If yes, how are multidisciplinary groups formed (criteria, objectives, balance between disciplines)?

Teaching activities and methods

6. What teaching methods do you use (e.g. Problem-Based Learning, Team-Based Learning, Design Thinking)?

6a. Can you describe a specific activity in which students learn through practice ("learning through making") and develop both technical skills and soft skills (collaboration, leadership, critical thinking)?

Assessment

7. Are tools such as portfolios, self-assessment or guided reflections used to monitor student development?

7a. Is there a final assessment?

8. What are the learning outcomes expected from the programme and how are they distributed across courses to guide the development of students' individual learning?

Impact on learning

9. How does the programme support students in connecting theory and practice, especially in interdisciplinary projects?

Sustainability

10. Regarding the topic of sustainability and how it is integrated into teaching?

The students came from a range of interdisciplinary fields of study within the three programmes, including Art and Media, Creative Sustainability, Economics and Management, and Industrial and Urban Engineering. The interviews were designed to understand how the students approached their learning, what challenges they had encountered, which aspects they considered most important, their engagement with other cultures and contexts, and how they believed they could apply their knowledge and skills in an interdisciplinary university setting and in the world of work. The interviews were structured around ten open-ended questions and lasted a maximum of 30 minutes. Students were able to indicate their availability via a file shared by email, which also provided them with various details: the project in progress, the objectives of the interview, technical aspects (recording and transcription to be activated subject to the interviewee's approval), the number of questions and the duration.

The questions asked to the students were:

1. Can you briefly tell me where you come from and Which faculty did you graduate from with a bachelor's degree? Which interdisciplinary course are you currently following?
2. What advantages arise from working with students from different backgrounds (design, architecture, engineering, economics, visual arts)?
3. What are the most common Challenges you encounter as a student in multicultural/interdisciplinary teams (language, working methods, expectations)?
4. How do you feel in a group with students from different disciplinary backgrounds?
5. Are there aspects of the programme that you find particularly stimulating or innovative and that have helped you learn more?
6. What interdisciplinary skills or knowledge have surprised you or that you did not expect to acquire?
7. What learning outcomes did you expect from the programme when you enrolled?
8. How do you think you can apply what you have learned in interdisciplinary contexts in the world of work or research?
9. What interdisciplinary tools or practices do you think you will use in the future (collaboration, design thinking, project management, shared reflection)?
10. How was the topic of sustainability integrated into the programme? (environmental/social)
Has your perspective on this topic changed since graduating, for example?

Interviews with teachers

Associate Professor of Sustainable Design

Sustainable Design, Creative Sustainability

Personal experience

A sustainability scholar and researcher in the field of design, she has developed a portfolio of teaching and research aimed at envisioning sustainable future systems. Her work focuses on socio-technical and socio-ecological systems, with a particular emphasis on production-consumption systems and cities.

Key phrases and significant insights

The aim is to teach students or provide them with a *framework* through which to think. To understand how to collaborate *creatively* and how to align their own skills with those of others, with an emphasis on reading, writing and *critical thinking*.

How would you describe the prevailing pedagogical approach in your programme?

The programme, coordinated by the Professor of Sustainable Design, is a joint initiative among the School of Arts, the School of Economics, and the School of Chemical Engineering. It is a joint interdisciplinary programme called 'creative sustainability'.

Interdisciplinarity and multiculturalism

What elements make your approach unique in this regard?

How is the cultural and international diversity of students integrated into teaching and learning?

Do you follow group or individual learning, or a combination of both?

Do you emphasise a mix of disciplines?

If yes, how are multidisciplinary groups formed (criteria, objectives, balance between disciplines)

The approach outlined below is unique because the programme recognises that sustainability issues cannot be tackled by individual disciplines alone. It emphasises that people with diverse skills and backgrounds must work together to address these issues. Skills relevant to sustainability matters, an understanding of each other's terminology, and an understanding of different ways of thinking when tackling a problem. The programme places emphasis on creative problem-solving.

As these are Master's programmes, there are many courses with different pedagogical approaches. Generally, in the core modules – those compulsory for students from all three schools – group work is the most common practice. This is because, he states, collaboration is one of the most important skills to be developed within the programme. In group work, they ensure that each group includes at least one student from each of the three schools, whilst also supporting individual learning.

Teaching activities and methods

What teaching methods do you use (e.g. Problem-Based Learning, Team-Based Learning, Design Thinking)?

Can you describe a specific activity in which students learn through practice ("learning through making") and develop both technical skills and soft skills (collaboration, leadership, critical thinking)?

Given the variety of courses on offer, some are theoretical and therefore place an emphasis on reading, writing and critical thinking. Others are project-based, in which students carry out projects and undertake practical tasks. Specifically, students work on issues related to sustainability and engage with companies, local or international authorities. The programme therefore employs various

pedagogical approaches, such as learning by doing, which aims to provide students with a framework for thinking.

Assessment

Are tools such as portfolios, self-assessment or guided reflections used to monitor student development? Is there a final assessment?

The lecturer's students do not produce a portfolio because they do not deal with design in the strict sense of the term, that is, with tangible objects. Instead, she favours a design or artistic portfolio that contains everything the students have produced to arrive at the final outcomes of their research. As regards self-assessment, she uses peer assessment to ensure fairness. Reflective writing, such as learning diaries and reflective essays, is included among the final summative assessments.

What are the learning outcomes expected from the programme, and how are they distributed across courses to guide the development of students' individual learning?

There are programme-level learning objectives, and each course has its own specific learning objectives that can be explored in greater depth. In the professor's course, these include: systems thinking, interdisciplinary skills, and the ability to drive change.

Impact on learning

How does the programme support students in connecting theory and practice, especially in interdisciplinary projects?

The course taught by the professor emphasises the link between theory and practice by combining theoretical learning with a project that requires students to apply what they have learnt.

Sustainability

Regarding the topic of sustainability and how it is integrated into teaching?

Sustainability is understood as a property of systems and of things or individual parts of the system. One of the most common compulsory modules is on systems thinking, which covers social, ecological and technical systems; here, sustainability becomes a holistic systemic property. When students begin writing their dissertations, they may tend to address issues of a more social or environmental nature.

Interviews with teachers

Associate Professor of Department of Design

Sustainable Design, Creative Sustainability

Personal experience

Her research focuses on the opportunities and contradictions of participatory design and contemporary participation, analysing how collectives and users interpret design spaces and how designers can make them more inclusive and sustainable. She is currently an associate professor in the Department of Design and heads the INUSE research group.

Key phrases and significant insights

A central element of the course is the simulation of *collaborative* activities: students take part in games and exercises with specific rules and constraints — for example, *building* objects together using blocks without speaking, with different roles such as *'lead designer'* and *'follower'* — in order to reveal the dynamics of collaboration, the mistakes made, the difficulties encountered and the opportunities for improvement.

How would you describe the prevailing pedagogical approach in your programme?

The lecturer's course is the most interdisciplinary and is an optional module. It comprises students from both the CS and IDBM programmes, for a total of 20 students.

Her methods are highly adaptable; as the group is small, she does not limit herself to lectures, but incorporates many exercises that prioritise group work and the flipped classroom approach. She also simply suggests going for a walk at certain times without making a big deal of it.

Her teaching approach is predominantly blended and very collaborative, made possible by the small group size.

Interdisciplinarity and multiculturalism

What elements make your approach unique in this regard?

How is the cultural and international diversity of students integrated into teaching and learning?

What makes this course unique is that, as it is a small, mixed-background programme, it brings together a wide variety of personalities from the fields of the arts, visual communication, product design, and creative sustainability, as well as from programmes very different from the arts, such as chemical engineering or computer science.

Do you follow group or individual learning, or a combination of both?

Do you emphasise a mix of disciplines?

If yes, how are multidisciplinary groups formed (criteria, objectives, balance between disciplines)

The aim of the course is to teach students to think from a design perspective within an interdisciplinary context. The lecturer endeavours to explain certain fundamental concepts, particularly for those encountering this subject for the first time, whilst striving to make the exercises and examples as relevant and accessible as possible for everyone. As regards the discussion phase, she aims to foster both individual and group learning.

In this regard, the groups are always mixed, and the composition is either decided by the lecturer or is randomised for shorter projects.

Teaching activities and methods

What teaching methods do you use (e.g. Problem-Based Learning, Team-Based Learning, Design Thinking)?

The aim of the course is not to get students working together straight away, when they do not yet know how, but to teach them how first. Specifically, to teach them to identify why they are not communicating with one another, or why they are

unable to make decisions, or how they might make decisions together, and how they might take the project forward.

Can you describe a specific activity in which students learn through practice ("learning through making") and develop both technical skills and soft skills (collaboration, leadership, critical thinking)?

In small groups, the students plan, carry out small-scale simulations and practise collaborative activities.

Everything is done as a game: for example, the teacher hands out small building blocks in sets of three, and the pupils have to build something together without speaking. One pupil starts by placing a block, another adds to it, and a third observes what is happening.

These types of games, which focus heavily on 'doing' and collaboration, last around 10 minutes, after which there is a discussion about what happened.

Assessment

Are tools such as portfolios, self-assessment or guided reflections used to monitor student development? Is there a final assessment?

During sessions in which students carry out a task, discussion becomes very important. Following student feedback requesting the inclusion of a personal assessment, she placed great emphasis on it and, furthermore, reduced the amount of lecturing. When students are planning, certain rules emerge that simulate how they work together or make decisions.

In such cases, the students internalise that experience and design a small simulation for their classmates. Specifically, they must organise it, design the materials and props, and then report on what they did, how they did it and what they learnt from the experience.

What are the learning outcomes expected from the programme, and how are they distributed across courses to guide the development of students' individual learning?

The tutor asks participants to develop, by the end of the programme, a shared vocabulary – in other words, a common language – and the ability to carefully organise a participatory session.

Impact on learning

How does the programme support students in connecting theory and practice, especially in interdisciplinary projects?

The lecturer suggests articles for students to read, which link theory to practice. Given the nature of the course, she focuses much more on what happens in the classroom – on discussion and classroom activities – and perhaps a little less on reading. He does not check whether they have read the material, but tells them that if they do read it, they will understand better why we discussed it. She believes that art students are much more open to this approach, whilst economics or engineering students say, 'I've never been in a class like this before. It seems very strange to me, but they are willing to give it a go in class.'

Sustainability

Regarding the topic of sustainability and how it is integrated into teaching?

In addition to the short exercises carried out in class, the lecturer also presents case studies or, in particular, PhD students who work on participatory design in the context of sustainability-related topics. They demonstrate how they have worked and share one of their techniques, which is then tested together.

For example, one of the PhD researchers worked with students to build small energy generators to replace some fossil-fuel energy sources with solar-powered systems. She carried out this work with various groups of young people in different schools and developed a workshop-based method to guide the pupils in creating these solar generators: understanding how the technology works, figuring out how to install it in schools, and actually building the generators. During the course, they try out some of the activities that the researcher herself has developed.

All the case studies he presents are real-life examples of people using collaborative and participatory design to reflect on sustainability issues. Sustainability is a central focus in all the projects. As regards its various aspects, some projects focus more on environmental sustainability, whilst others focus primarily on social sustainability. In total, there are around four or five guest lectures, and all the projects presented are related to sustainability.

Interviews with teachers

Senior Lecturer at the Department of Architecture

Urban Studies and Planning, research on education, research on public space

Personal experience

Her research centres on three main areas: the field of education, where she focuses on interdisciplinarity and sustainability; the context of public spaces, where she studies spatial justice, the spatio-temporal aspects of everyday life, instability and mobility. With regard to this last point, she is a member of the AESOP Thematic Group on Public Spaces and Urban Cultures.

Key phrases and significant insights

All too often, there is a risk of tackling the *wrong problem*, which is why it is essential to comprehend its nature. The problem is more important than the *solution*, because one might propose solutions that fail to address the root causes. It is precisely for this reason that we seek to place *particular emphasis* on this aspect.

How would you describe the prevailing pedagogical approach in your programme?

The programme is organised by two partner universities: Aalto University and the University of Helsinki, and by six different departments at Aalto. It is run by the Department of Architecture and the Department of Real Estate Economics; therefore, students take courses from these two departments at Aalto. At the course level, the teaching approach for the workshops is student-centred, project-based and problem-based.

Interdisciplinarity and multiculturalism

What elements make your approach unique in this regard?

What makes the USP programme unique is that the students come from at least six different disciplines. The lecturer gives examples of students from different educational backgrounds and sectors, such as the automotive industry, architecture, design, economics, and engineering; these students are joined by those studying sociology, geography, and environmental sciences at the University of Helsinki. The students work together on the same project during the compulsory modules; their skills are assessed within the context of the projects, and, from the lecturer's perspective, they are all considered to be on the same level. With regard to this last point, the lecturer and her colleagues give students the option to meet the minimum requirements or exceed them, depending on their professional backgrounds. In fact, year after year, the programme is revised, particularly the laboratory courses, to cater for varying levels of competence.

How is the cultural and international diversity of students integrated into teaching and learning?

One cultural aspect that has emerged over the years, of which the teacher and her colleagues are increasingly aware, is the use of English. Most students are not native English speakers and therefore not all of them feel very confident writing or speaking in English. They take great care to ensure that language does not become a barrier between students; if there are students from the same language group or nationality, they may unintentionally end up sticking together and perhaps speaking in their own language. To avoid such situations, they ensure that students are mixed together when working, both across subject areas and with people from different language groups, always encouraging them to interact.

Do you follow group or individual learning, or a combination of both? Do you emphasise a mix of disciplines?

If yes, how are multidisciplinary groups formed (criteria, objectives, balance between disciplines)

At the programme level, it consists of a combination of group and individual activities; at the level of the workshop modules, which currently form the core of the programme, there are two:

In the first, students begin with a number of individual tasks, mainly reflective exercises, and complete an individual assignment at the start of the first workshop. They then begin working in pairs and must choose a new partner each week; the principle is that the other student they are paired with must come from a different discipline, before moving on to group work. Group work does not preclude individual reflections or individual assignments.

Teaching activities and methods

What teaching methods do you use (e.g. Problem-Based Learning, Team-Based Learning, Design Thinking)?

Can you describe a specific activity in which students learn through practice ("learning through making") and develop both technical skills and soft skills (collaboration, leadership, critical thinking)?

In the first workshop, the approach is experimental: students must identify the problem themselves; the tutors do not provide it. They are asked to identify the problem and then trained to use various data collection and analysis tools so they can define it from an interdisciplinary perspective. Learning is based on teamwork, and design thinking is always the framework within which they work; this means that their approach is iterative. In the second workshop, the emphasis shifts to defining the problem, so students are presented with various challenges to solve. Furthermore, thinking about the future has also been introduced into the course – an interesting aspect of the planning approach that goes beyond the human dimension. The underlying idea is that the two workshops are complementary. The first serves as a prerequisite for the second, and the aim is to help students understand that there is often a risk of solving the wrong problem and, consequently, of failing to grasp the true nature of the problem.

Assessment

Are tools such as portfolios, self-assessment or guided reflections used to monitor student development? Is there a final assessment?

In terms of assessment, the lecturer employs formative assessment – observing the process and the way students learn throughout the course – and summative assessment – the final assignment.

In the first workshop, students have small weekly assignments, followed by a group presentation and a mid-term assessment. They also submit a report and carry

out activities that may vary: these might include a presentation, a video, or, at times, a poster exhibition. So the final product varies, and the aim is for students to learn how to communicate their ideas to different audiences. They always hand in individual reflections as well and are guided through the process, with suggestions provided. In the second workshop, greater emphasis is placed on the learning process and peer learning. They seek to assess both the process of working in interdisciplinary groups and communication: how well do they manage to communicate with one another?

With regard to communication, three levels are explored: the first involves communicating with people from different disciplines and exploring the terminology used in those disciplines. A second level focuses on how students communicate with an academic audience. How can they support their work with research and evidence? And how can they communicate what they have studied? The third level of communication concerns how students communicate their proposals to policy-makers, the public, vulnerable groups, or specific groups. In one semester, for example, one of the groups decided to present their project to children of a certain age group.

What are the learning outcomes expected from the programme, and how are they distributed across courses to guide the development of students' individual learning?

The two workshops intend to address two key learning outcomes of the programme: cross-disciplinary collaboration and the link between research and analysis and real-life situations. To achieve this, the lecturer and her colleagues do not rely solely on what they teach in their own modules, but also coordinate with other compulsory modules in the programme during the same semester. For example, at the University of Helsinki, they run the GIS course, the first-year module and an introduction to urban studies and planning, all of which students take in the same semester. They usually aim to jointly plan the timetable for these three courses, as well as the topics to be covered and how the three courses may work together to support students' knowledge and skills.

On the practical side, the GIS course – a basic one – also seeks to address urban problems through exercises. Throughout the programme, theory and practice are gradually linked once again. In Studio 1, the theory is drawn mainly from lectures delivered by speakers from different disciplines, and students then seek to link the topics covered to their area of study. In Studio 2, however, in addition to the lectures, students are required to read texts on specific planning topics from various disciplinary perspectives: property, ecology, transport, economics, sociology, planning, design and so on.

Impact on learning

How does the programme support students in connecting theory and practice, especially in interdisciplinary projects?

Without a practical perspective, students will not be able to gain an integrated understanding of the problem's complexity. They also ask students to take part, where possible, in visits to the study area alongside local residents and users, so that they can make observations and conduct interviews. They consult social and traditional media to understand the concerns of people in a particular area, and ideally, they would like students to interact with local people from start to finish as part of a transdisciplinary approach. This requires more resources, and she believes the main reason they are not doing so is that courses are limited to one semester or two terms; furthermore, a budget would be needed if they were to involve communities in carrying out projects.

Sustainability

Regarding the topic of sustainability and how it is integrated into teaching?

The aim of the programme is to help students understand that sustainability should not be taken literally or treated superficially, and that they must pay equal attention to the three pillars: environmental, social and economic. The lecturer seeks to make this point very clear right from the start of the course. Students are asked questions to kick-start the discussion, such as: If we focus on achieving sustainable development targets before considering what changes can be made, how can we transform this approach? How does our work impact the planet? How can we transform cities to develop a more inclusive future?

Interviews with teachers

Head of International Design Business Management

Service Design, Managerial approaches and organisational practices, Innovation management

Personal experience

She gained her experience through a degree in design and innovation management and through her work as a service design consultant. Today, she teaches design practice in interdisciplinary, project-based courses in higher education, with a particular focus on service development in cities, public services, public administrations and B2B commercial organisations. Her research interests include public service ecosystems through critical life transitions, the combination of design, and progressive organisational leadership.

Key phrases and significant insights

The aim is to encourage students to reflect on why they think the way they do and on the factors that shape their *understanding* of the world. In this regard, diversity – particularly international diversity – takes centre stage, alongside an analysis of how *cultural norms* and factors influence thought processes. The aim is also to encourage *students* to immerse themselves in the culture of their partners, whether they be colleagues or clients.

How would you describe the prevailing pedagogical approach in your programme?

The IDBM programme is a two-year Master's programme. In the first year, students learn a problem-solving approach, with project groups formed on a multidisciplinary or interdisciplinary basis. So, from day one, students are placed in groups to learn to apply this problem-solving approach through a series of industry-led challenges. There are numerous collaborations with external partners, designed to enable students to work alongside companies within these groups or to immerse themselves in other disciplines. Combined with collaboration with other start-ups, this creates a learning-by-doing programme.

Interdisciplinarity and multiculturalism

What elements make your approach unique in this regard? How is the cultural and international diversity of students integrated into teaching and learning?

She tries to encourage students to reflect on: 'Why do I think this way? What influences my understanding of the world?' and then on the topic of diversity, particularly international diversity. Furthermore, in these courses, she conducts numerous team-building activities to analyse which cultural values and factors influence how people think and work in groups.

In this first part, the focus is mainly on the group's soft skills, whilst in the second part, the work is more closely linked to the company or the project. The project lasts around seven months, during which students are immersed in a different environment. In this course, students are encouraged to engage with the cultures of partners, clients, and other stakeholders involved in co-creating value. They are also encouraged to consider their own cultural background when working with people outside their own team.

Teaching activities and methods

What teaching methods do you use (e.g. Problem-Based Learning, Team-Based Learning, Design Thinking)?

Can you describe a specific activity in which students learn through practice ("learning through making") and develop both technical skills and soft skills (collaboration, leadership, critical thinking)?

As part of the programme, the lecturer focuses on design and interdisciplinarity amongst students and beyond. The courses include students from diverse backgrounds; initially, they undertake team-working exercises designed to encourage them to consider their own ways of thinking and acting. In this way, students develop their own ideas, share them with others using different languages and

methods, and become more mentally flexible. The lecturer plays a key role in ensuring consistency: lecturers must be clear and avoid technical or excessively specific language.

Assessment

Are tools such as portfolios, self-assessment or guided reflections used to monitor student development? Is there a final assessment?

In terms of activities and assessment, the lecturer proposes various methods, such as preparing a course handbook, which will contain all the work carried out by the students. During the course, there are two types of activity: assignments that are not compulsory for passing the course but which help students to make progress with their project work, and short practical exercises in which students must put what they have learnt into practice. For example, she asks them to start writing down results and observations using templates, or, following a lesson on analysis, to apply what they have learnt straight away. At the end, a final report is often produced, with very precise guidelines on what it must and must not contain, accompanied by a final presentation and/or entries in learning diaries in which writing plays a fundamental role.

What are the learning outcomes expected from the programme, and how are they distributed across courses to guide the development of students' individual learning?

Students' learning takes place over time, as he explains; it is a continuous process, comprising both application and reflection. It becomes practical when students can apply and reflect on the concepts. The teacher acts as a guide through the various projects and manages expectations. Students can pursue objectives on various scales: social, environmental and economic.

Impact on learning

How does the programme support students in connecting theory and practice, especially in interdisciplinary projects?

The projects taught by the lecturer take a holistic approach and address complex systemic issues; the teaching therefore operates across multiple scales (micro, meso, and macro) and seeks to 'zoom in' and 'zoom out'.

Sustainability

Regarding the topic of sustainability and how it is integrated into teaching?

In this context, sustainability is viewed in terms of change and impact. Change is seen as a collective, gradual process, whilst the resulting impact is defined.

Interviews with teachers

Pedagogical expert

Educational developer, Teaching, Wellbeing of communities

Personal experience

An expert in educational development with significant experience in the higher education sector. She has a thorough understanding of the key aspects within this community. Her interest is not limited to teaching and its various intrinsic aspects; it also extends to learning and the interconnections between the two. She is also involved in DEI (Diversity, Equity and Inclusion) and community wellbeing.

Key phrases and significant insights

One approach we might consider adopting is a *student-centred*, at least partly *design-oriented*, approach, characterised by innovative teaching methods closely linked to the skills and approaches needed by the world of work.

How would you describe the prevailing pedagogical approach in your programme?

The lecturer runs pedagogy courses for teachers and, in her view, the pedagogical approach to adopt is a form of student-centred teaching with a design-oriented focus – an innovative way of teaching linked to the skills and methods required in working life. Of course, every lecturer at Aalto decides independently which pedagogical approach to adopt. So the choice is theirs; indeed, there is no single way of doing things. At present, although there is no rigid pedagogical approach that is binding on all lecturers, the focus is on cross-cutting themes. For example, sustainability, an entrepreneurial mindset and so on.

Interdisciplinarity and multiculturalism

What elements make your approach unique in this regard? How is the cultural and international diversity of students integrated into teaching and learning?

When you are faced with students who have an interdisciplinary approach or background, you see this as a unique aspect, because each of them brings their own background, experiences and culture into the classroom, which becomes an integral part of the teaching and learning process. So, in your view, this should be valued, highlighted and taken into account within the teaching context. Consequently, when the university attempts to attract new students to apply, this is one of the things they emphasise. One view expressed by students, particularly international students, is that they appreciate being able to be themselves at university and showcase their knowledge and, perhaps, their prior studies or work experience. She suggests that teaching methods should also be organised in this way to take this aspect into account – what students bring to the table, not just what we can offer them or what the university can offer them.

Do you follow group or individual learning, or a combination of both? Do you emphasise a mix of disciplines? If yes, how are multidisciplinary groups formed (criteria, objectives, balance between disciplines)

The expert explains that the University emphasises teamwork as one of the professional skills it aims to develop. Work is often carried out in groups, as this is one of the things teachers want to teach them, in addition to the subject matter they are learning. Students will need to collaborate with a wide range of people, which is why the University wants to equip them with skills such as engaging in dialogue with people from different backgrounds.

Teaching activities and methods

What teaching methods do you use (e.g. Problem-Based Learning, Team-Based Learning, Design Thinking)?

Can you describe a specific activity in which students learn through practice (“learning through making”) and develop both technical skills and soft skills (collaboration, leadership, critical thinking)?

In an interdisciplinary context, one of the most widely used methods is problem-based learning, or courses that emphasise links towards real-world contexts, perhaps through collaboration with a company or local council throughout the course, to offer students practical experience and a real-world problem to work on. For example, in architecture, there are many links with local companies and towns.

Assessment

Are tools such as portfolios, self-assessment or guided reflections used to monitor student development? Is there a final assessment?

When there is a group project, almost always at least one group encounters difficulties; for this reason, individual discussions with students are not enough – there must also be group discussions or some way to ensure that the group makes progress. In a sense, it is as if the course were taking place within a company: all the students would be working for a firm and would have a supervisor who would say, ‘Show me what you’ve done on the project you’re working on.’ Similarly, he advises teachers who struggle with the group-work aspect to ensure that the project progresses not only in terms of content – that is, what they are actually doing in their project – but also by considering the dynamics of group discussion and interpersonal skills. For this reason, he tends to advise teachers who find it difficult to manage these parts to pay attention to the whole process: not just to the group finding a topic and presenting something at the end, but also to what happens in between.

What are the learning outcomes expected from the programme, and how are they distributed across courses to guide the development of students’ individual learning?

What he seeks to emphasise in his courses is that when lecturers set out the expected learning outcomes for their courses, these should not only cover subject-specific content but also skills. This is why they have opted for group work,

which is one of the most common practices. When students arrive and ask: 'Why do we have to do group work? Can I do an individual assignment? I don't want to work with other people; I'd rather do it all on my own'. That is when the teacher must be fully aware of all the underlying pedagogical reasons and be able to explain them clearly.

So all of this must be very clear in the teacher's mind, so that they have the necessary confidence not so much to 'defend' these choices, but to justify and explain them to the students.

Impact on learning

How does the programme support students in connecting theory and practice, especially in interdisciplinary projects?

What stands out at Aalto University is the combination of teaching and learning, or of teaching and research. This should be one of the aspects that teachers convey and that we seek to promote in teacher training programmes and systems. We should try to encourage teachers to incorporate their own research into their teaching. However, as pedagogical research shows, this practice is not as straightforward as it might seem.

Sustainability

Regarding the topic of sustainability and how it is integrated into teaching?

There are certain disciplines in which sustainability is deeply embedded; there are entire master's programmes based specifically on the concept of sustainability, whilst in others it is more difficult to find a connection. As an expert in pedagogy, she has sought to organise events or workshops where tutors could come to identify aspects of sustainability or receive guidance. But it is not always easy, she explains, or the link may be much weaker than teachers would expect or hope for. What she would do is look for aspects of sustainability at the programme level; in other words, map out the entire course and see where sustainability is actually evident. This is because students do not just take a single module but follow an entire programme. So we need to understand where sustainability is present and in what forms. It doesn't necessarily have to be just environmental protection: it can also be social sustainability, such as wellbeing or similar issues.

Interviews with students

Urban Studies and Planning Student

Biographical context

A Swedish student from Stockholm, she completed her bachelor's degree in Östersund, northern Sweden, specialising in regional urban planning. She holds a degree in science with a specialisation in human geography and is currently taking an interdisciplinary course in planning theory and the history of architecture.

Key phrases and significant insights

I think deepening my knowledge in my own field is essential to *understanding other disciplines* – such as the visual arts and design, which interest me greatly. That's how I've learnt to *understand others*.

Can you briefly tell me where you come from and Which faculty did you graduate from with a bachelor's degree? Which interdisciplinary course are you currently following?

The student has a background in urban planning and human geography, and she is currently enrolled in the interdisciplinary Urban Studies and Planning course.

What advantages arise from working with students from different backgrounds (design, architecture, engineering, economics, visual arts)?

She believes deepening her knowledge in her field helps her better understand other people's points of view.

What are the most common Challenges you encounter as a student in multicultural/interdisciplinary teams (language, working methods, expectations)?

When working on a group task, communication difficulties arise around language and methods, but she tries to do her bit to keep the project moving forward. She says she finds it difficult to communicate with people from different cultural backgrounds, not only because they studied different subjects during their three-year degree, but also because they, like everyone else, have different experiences.

How do you feel in a group with students from different disciplinary backgrounds?

She feels positive and secure. Being around students from different backgrounds reduces the sense of competition she often felt during her three-year degree. With such a variety of disciplines, she says, it is as if everyone brings a different level of knowledge to the table.

Are there aspects of the programme that you find particularly stimulating or innovative and that have helped you learn more?

She finds it interesting to discover how other students interpret the topics and compare their interpretations with her own. She found this exercise very stimulating, and it helped her gain a different perspective.

What interdisciplinary skills or knowledge have surprised you or that you did not expect to acquire?

It challenged her point of view and perspective; this surprised her greatly, as it enabled her to think outside the box and put her to the test.

What learning outcomes did you expect from the programme when you enrolled?

She would have liked to broaden her perspective on design – and consequently on planning – beyond architecture. However, she believes she has learnt to collaborate more effectively and will continue to keep an open mind.

How do you think you can apply what you have learned in interdisciplinary contexts in the world of work or research?

During the courses she took, she learned the 'think-and-share' approach, which involves reflecting on something individually and then sharing thoughts. She believes this is an excellent way of doing things because collaborative activities should not rely on hierarchy but should take everyone's opinions into account.

What interdisciplinary tools or practices do you think you will use in the future (collaboration, design thinking, project management, shared reflection)?

The student explains that collaborative projects can sometimes be more demanding than simply being given something new, so it is really a matter of finding someone you get on well with and 'establishing what's at stake'.

How was the topic of sustainability integrated into the programme? (environmental/social)

Has your perspective on this topic changed since graduating, for example?

Sustainability is a topic covered in the students' courses. As far as environmental and social aspects are concerned, it depends on the type of course. Since completing her bachelor's degree, her perspective has changed, broadening and taking on different meanings depending on the context. As a result, she has reflected much more deeply on the subject.

Interviews with students

Urban Studies and Planning Student

Biographical context

The Finnish student from Tampere completed her bachelor's degree at the University of Applied Sciences, specialising in building architecture, and is now studying Urban Studies and Planning at Aalto.

Key phrases and significant insights

It always surprises me how different or *similar people's ideas* can be, and how much they appreciate the company's vision.

Can you briefly tell me where you come from and Which faculty did you graduate from with a bachelor's degree? Which interdisciplinary course are you currently following?

The student has knowledge of applied sciences, architectural design and planning for the well-being of the planet, thanks to the Urban Studies and Planning course she is currently taking.

What advantages arise from working with students from different backgrounds (design, architecture, engineering, economics, visual arts)?

Her experience was rewarding, though at times frustrating when she came into contact with other students' views; often, her views were not shared, given their differing lines of reasoning. She would have liked more creativity in the course, but overall, she says she had a good experience.

What are the most common Challenges you encounter as a student in multicultural/interdisciplinary teams (language, working methods, expectations)?

Language was one of the obstacles she faced, but it ultimately proved to be an important learning experience, alongside the various working methods she was exposed to. Another challenge she mentioned was organising activities and meetings with her coursemates. At times, she found it difficult to keep up with the students' pace, even though she still managed to complete her work within the deadlines. She wondered whether this difficulty might be linked to the age difference between her and her classmates: around ten years, given that she is 30 whilst her classmates are around 20. Despite this, she admires her classmates and enjoys working both in a group and on her own.

How do you feel in a group with students from different disciplinary backgrounds?

She says she finds it very interesting and useful, as she has already gained experience in various cities and across different sectors, and she is better able to understand group dynamics.

Are there aspects of the programme that you find particularly stimulating or innovative and that have helped you learn more?

What helped her deepen her knowledge were the clear instructions and the clearly defined deadlines, dates, and times. This aids her learning from both the teachers and the group.

What interdisciplinary skills or knowledge have surprised you or that you did not expect to acquire?

She is surprised by how wise her colleagues are, how well they know what they're doing, and how self-assured they are; this last point also applies to their personalities.

What learning outcomes did you expect from the programme when you enrolled?

She is quite satisfied with the course and loves the flexibility between students and teachers; nevertheless, she feels that certain aspects – such as the structure, content, dates, and timetables – could be more precise.

How do you think you can apply what you have learned in interdisciplinary contexts in the world of work or research?

In a work environment, she believes she can share the flexibility and communication practices she has learned in the course.

What interdisciplinary tools or practices do you think you will use in the future (collaboration, design thinking, project management, shared reflection)?

She learned a great deal about teamwork tools and practices, such as collaboration, fulfilling roles within groups, and project management. For example, she learned how an idea or outcome takes shape, how this works at university, and how it is refined.

How was the topic of sustainability integrated into the programme? (environmental/social)

Has your perspective on this topic changed since graduating, for example?

According to the student, sustainability is integrated into the syllabus, and she really likes this as the topic is very close to her heart. She hasn't learnt anything about sustainability in the strict sense, as she already knew this information; in general, social sustainability interests her because she is writing her dissertation on this sort of topic.

Interviews with students

Urban Studies and Planning Student

Biographical context

She is an Estonian student who has completed a three-year degree in landscape architecture and has knowledge of urban planning and planning theory.

Key phrases and significant insights

If you realise that most people don't see things the same way as you do, and if you want to *communicate* your ideas – or perhaps explain them, even to the general public – *I think* the work done so far has provided you with some tools or a certain *understanding* of how to go about it.

Can you briefly tell me where you come from and Which faculty did you graduate from with a bachelor's degree? Which interdisciplinary course are you currently following?

The student holds a three-year bachelor's degree in landscape architecture and is currently taking courses in GIS programming and planning theory. These are modules she has chosen as part of the Urban Studies and Planning programme.

What advantages arise from working with students from different backgrounds (design, architecture, engineering, economics, visual arts)?

The benefits certainly lie in getting to know different contexts, cities or countries. She thinks it is interesting to see how people outside her own discipline think.

What are the most common Challenges you encounter as a student in multicultural/interdisciplinary teams (language, working methods, expectations)?

Given that the student comes from a more practical background, whilst her colleagues have a more academic background, this makes the whole process more challenging. For example, their technical skills differ, as do the types of technological or software skills they can use; this proved challenging when they also had to produce visual material as well as text-based content. She believes it takes time to reach a common understanding.

How do you feel in a group with students from different disciplinary backgrounds?

She gets the impression that, in such a multidisciplinary group, there isn't a strong sense of community; it doesn't strike her as though they are a group that studies together, whereas she notes that some students – perhaps the architecture students – have a greater sense of belonging, even outside the university setting.

Are there aspects of the programme that you find particularly stimulating or innovative and that have helped you learn more?

What the student finds most innovative is the degree programme itself, as it enables her to work with diverse groups of people who have different perspectives on urban issues.

What interdisciplinary skills or knowledge have surprised you or that you did not expect to acquire?

She believes that teamwork is one of the most important skills she is developing significantly during her studies.

What learning outcomes did you expect from the programme when you enrolled?

She is trying to become a designer or a professional in the field of design, and, specifically, she was expecting more hands-on work.

How do you think you can apply what you have learned in interdisciplinary contexts in the world of work or research?

In her future career, the student says she will be aware of her abilities and will be able to explain her strengths to the public.

What interdisciplinary tools or practices do you think you will use in the future (collaboration, design thinking, project management, shared reflection)?

She has developed a better understanding of how to communicate her qualities and abilities. She will know who to turn to, who to ask, and when to ask someone else to check something. She believes that recognising these moments, as part of planning or design, is also a skill in itself.

How was the topic of sustainability integrated into the programme? (environmental/social)

Has your perspective on this topic changed since graduating, for example?

At times, she has had the impression that sustainability and resilience are a little too superficial, and she wonders whether that is really how they should be: sustainable, eco-friendly and so on, but without delving deeper into them. She believes that understanding these concepts makes people truly critical when assessing sustainability, as it becomes second nature to ask, for example, 'Are these solutions really sustainable?', and then to analyse them.

Interviews with students

Creative Sustainability Student

Biographical context

Originally from Mexico City, she completed her bachelor's degree in product design at Tec de Monterrey University. She is currently studying for a degree in CS (Creative Sustainability) at Aalto University, specialising in design.

Key phrases and significant insights

I believe the courses place great *emphasis* on going beyond environmental sustainability to account for *social and economic* aspects. For example, how can society ensure the long-term *sustainability* of this project?

Can you briefly tell me where you come from and Which faculty did you graduate from with a bachelor's degree? Which interdisciplinary course are you currently following?

She completed her bachelor's degree in Product Design at Tec de Monterrey University and is currently studying on the Creative Sustainability programme, specialising in design.

What advantages arise from working with students from different backgrounds (design, architecture, engineering, economics, visual arts)?

Given that she has a background in design and is studying design again as part of the programme, she has realised that her view of things might be a little idealistic. For example, the economics students have taught her a great deal because she can see the world through their eyes, and their priorities differ from hers as a designer; they encourage her to take a more practical approach.

What are the most common Challenges you encounter as a student in multicultural/interdisciplinary teams (language, working methods, expectations)?

She believes that the biggest challenge is integrating the disciplines in the right way and getting them to work together. She thinks that translating expertise is the hardest part; for example, what can be drawn from disciplines such as economics or engineering? She asks herself many questions about how to learn from different disciplines and how to transfer that knowledge without preconceptions or prejudices. Another example he cites concerns the political sphere; coming from Mexico, where politics is very much a part of everyday life, he naturally wants to bring some of that perspective into his projects, but he finds himself at odds with people in Finland who are very neutral.

How do you feel in a group with students from different disciplinary backgrounds?

She enjoys meeting people from different cultures and experiencing perspectives unlike her own. She feels she learns much more from this than from the course as a whole.

Are there aspects of the programme that you find particularly stimulating or innovative and that have helped you learn more?

Taking courses in other faculties, in your view, gives you access to courses you would not otherwise be able to take; and this is precisely the central aim of the whole Master's programme: to study one part and then come together with others for a specific project.

What interdisciplinary skills or knowledge have surprised you or that you did not expect to acquire?

What she enjoys most and finds stimulating is engaging with other disciplines and understanding how they approach certain topics she is familiar with, such as sustainability, but from an economic perspective. What she finds stimulating is stepping outside her comfort zone.

What learning outcomes did you expect from the programme when you enrolled?

What she gained from the course was an opportunity to broaden her design skills so that she could work with people in other fields and gain an understanding of the world beyond design; furthermore, her expectations were centred on learning the theory, given that master's programmes at university are predominantly theoretical.

How do you think you can apply what you have learned in interdisciplinary contexts in the world of work or research?

What interdisciplinary tools or practices do you think you will use in the future (collaboration, design thinking, project management, shared reflection)?

Her cultural background certainly includes a whole range of transferable skills, including technical ones such as working with people. She has learnt to get on well even with people she doesn't like, as this is all part of the experience, and she is very happy to take on these challenges.

How was the topic of sustainability integrated into the programme? (environmental/social)

Has your perspective on this topic changed since graduating, for example?

The student argues that every course she takes addresses how to make a sustainable impact, even though the definition of sustainability varies from course to course, and these courses emphasise thinking beyond ecological sustainability to include social and economic aspects.

Interviews with students

Urban Studies and Planning Student

Biographical context

The student comes from Bangladesh, where he completed a three-year bachelor's degree in urban and regional planning, and is now studying for a master's degree in Urban Studies and Planning, specialising in property economics.

Key phrases and significant insights

People with a background in the social sciences, in particular, are better able to grasp *social issues* than I am. I would say that this is the case in certain situations, especially when it comes to *people's feelings* in a particular context.

Can you briefly tell me where you come from and Which faculty did you graduate from with a bachelor's degree? Which interdisciplinary course are you currently following?

He has a background in urban and regional planning, having completed a three-year degree, and is currently studying on the Urban Studies and Planning programme, specialising in property economics.

What advantages arise from working with students from different backgrounds (design, architecture, engineering, economics, visual arts)?

He claims that engaging with students from different academic disciplines, particularly in collaborative projects, is an advantage; it allows for a range of perspectives to be brought to bear to arrive at the best solution. Furthermore, it enables him to explore in detail certain areas with which he is unfamiliar, such as the social sciences or scientific data.

What are the most common Challenges you encounter as a student in multicultural/interdisciplinary teams (language, working methods, expectations)?

The advantage of being in an interdisciplinary course is that it gives students a broader perspective. For example, a highly technical course in urban GIS also requires basic knowledge of geography; those without these skills may find it difficult to keep up with the course at the outset.

How do you feel in a group with students from different disciplinary backgrounds?

Coming from a country very different from Finland, he sometimes feels frustrated by the atmosphere around him; it takes him a little longer to appreciate his colleagues and their cultures.

Are there aspects of the programme that you find particularly stimulating or innovative and that have helped you learn more?

In the courses, he finds it interesting to combine his own knowledge with that of others, to express himself, and he also has a certain amount of respect for the teachers, as they give him a sense of confidence.

What interdisciplinary skills or knowledge have surprised you or that you did not expect to acquire?

What surprised him was the practice of questioning established ideas or theories; he had never witnessed open debates between students and teachers before. He found it very interesting and innovative that issues related to housing and the economy, which are in some way linked to the war and to the impact of immigrants on society, were openly discussed and challenged by the students.

What learning outcomes did you expect from the programme when you enrolled?

He would have preferred more collaborative, specialised courses integrated with existing institutions, to gain a better understanding, alongside companies, of what they are learning so that he could put it into practice. He would also like to continue his studies in order to gain a new perspective on various theories and points of view.

How do you think you can apply what you have learned in interdisciplinary contexts in the world of work or research?

In his future career, he believes it is important to continue to take on board ideas from others, understand what they are trying to say and then reflect on their insights. He also points out that it is important to understand people's needs and improve one's work accordingly, even if it will be difficult to put this into practice at first.

What interdisciplinary tools or practices do you think you will use in the future (collaboration, design thinking, project management, shared reflection)?

Working in an interdisciplinary environment has enabled him to acquire both technical skills and soft skills.

**How was the topic of sustainability integrated into the programme? (environmental/social)
Has your perspective on this topic changed since graduating, for example?**

As a student of urban planning, he has long been familiar with the concept of sustainability, but today he feels much more focused on the subject. Whereas before he would talk about sustainability, he used to focus mainly on the human aspect; now, however, he has broadened his perspective to include the animal realm, for example.

Interviews with students

Creative Sustainability Student

Biographical context

A Finnish student from Tampere who moved to Helsinki to complete her degree at the Business School, specialising in marketing. She is now studying for a Master's degree in Creative Sustainability, specialising in business.

Key phrases and significant insights

I paid less attention to the fact that we come from different *cultures* and more attention to the fact that some people have far more experience in this area. This *multicultural* context is extremely interesting, and I think it adds great value.

Can you briefly tell me where you come from and Which faculty did you graduate from with a bachelor's degree? Which interdisciplinary course are you currently following?

Her bachelor's degree was business-oriented; she studied at the Business School and specialised in marketing. She is now enrolled on the Creative Sustainability programme.

What advantages arise from working with students from different backgrounds (design, architecture, engineering, economics, visual arts)?

The benefits she values are the opportunity to work with students from different disciplines, the realisation that her studies encompass many different perspectives, and the value of working with a group that encourages her to reflect on how she communicates her ideas.

What are the most common Challenges you encounter as a student in multicultural/interdisciplinary teams (language, working methods, expectations)?

Sometimes she points out that during group work, issues are raised to understand what is not working and how to improve; in her view, these should be addressed rather than left in the background simply to avoid conflict.

How do you feel in a group with students from different disciplinary backgrounds?

She refers to the sense of community she feels within the groups and explains that, at the start of the course, as she had many modules in common with her colleagues, she felt this very strongly; now she feels less involved in the community and perceives the atmosphere as less vibrant. She would like to integrate more fully and feel that sense of togetherness again.

Are there aspects of the programme that you find particularly stimulating or innovative and that have helped you learn more?

For her, the multicultural aspect lies primarily in experience rather than nationality; she feels that students from abroad attending her master's course are older and may therefore have more work experience. Local students, on the other hand, may have completed their three-year degree and enrolled on the master's programme straight away. This makes her hold the international students in high

regard, even though she sometimes feels she knows less than they do.

What interdisciplinary skills or knowledge have surprised you or that you did not expect to acquire?

Together with the group, she was encouraged to reflect, for example, on the objectives and rules of group work and on how they intended to proceed. During her bachelor's degree, she studied a number of concepts for working effectively in a team, and she believes this taught her a great deal.

What learning outcomes did you expect from the programme when you enrolled?

When she enrolled on the course, her ambition and main aim were simply to learn something about sustainability. She realised that this interdisciplinary approach was important, but it wasn't something she was particularly interested in. Now she thinks it's very important to meet people and work with them: they encourage her to think differently and make her reflect on her own way of working too.

How do you think you can apply what you have learned in interdisciplinary contexts in the world of work or research?

She says that, in her view, working in this way is very practical; she believes it is important to feel at ease in an interdisciplinary environment; she also considers it a very valuable skill that will stand her in good stead in her working life, and she says that the programmes have prepared her sufficiently to tackle it.

What interdisciplinary tools or practices do you think you will use in the future (collaboration, design thinking, project management, shared reflection)?

She had a very positive view of what could be achieved in the early years of her studies; the subsequent years, however, were characterised by a strong sense of despair. She feels she has learned more challenging subjects and argues that the curriculum includes a great deal of content designed to prepare students for the chaos of the real world.

How was the topic of sustainability integrated into the programme? (environmental/social) Has your perspective on this topic changed since graduating, for example?

She believes it takes a great deal of resilience, strength and the ability to cope with stress. In this sense, she believes that the type of group they form and the skills they develop – the way they combine different interests and try to find something that works for all of us – is a sort of miniature version of the work that needs to be done on sustainability.

Interviews with students

Urban Studies and Planning Student

Biographical context

The student comes from a small town in the Czech Republic, and she completed her three-year bachelor's degree in Bern at the Faculty of Architecture of the Brno University of Technology (BUT), specialising in architecture and urban design; she is now studying on the Urban Studies and Planning programme.

Key phrases and significant insights

Her new approach to *sustainability* focuses on taking non-human aspects into account in planning, and she questions whether it is enough *simply* to consider sustainability within projects, perhaps by incorporating related issues.

Can you briefly tell me where you come from and Which faculty did you graduate from with a bachelor's degree? Which interdisciplinary course are you currently following?

She has a background in architecture and urban design, having completed a three-year degree, and is currently enrolled on the Urban Studies and Planning programme.

What advantages arise from working with students from different backgrounds (design, architecture, engineering, economics, visual arts)?

It is worth incorporating studies from other degree programmes of which you may not be aware, such as sociology, ecology and property studies.

What are the most common Challenges you encounter as a student in multicultural/interdisciplinary teams (language, working methods, expectations)?

The biggest challenge is working out how to divide tasks within a group; in her opinion, tackling this issue requires clear communication to clarify the options, the required skills, and the work to be done.

How do you feel in a group with students from different disciplinary backgrounds?

According to her, it is stimulating to find oneself in a different environment and to keep an open mind towards different points of view; a programme such as the one she is enrolled in allows her to put these activities into practice.

Are there aspects of the programme that you find particularly stimulating or innovative and that have helped you learn more?

Having been introduced to this approach to studying, she feels it has been a completely different experience and believes the programme is truly interesting, as it brings together a wide range of disciplines. She says it is innovative in this respect, as it brings together people from different backgrounds.

What interdisciplinary skills or knowledge have surprised you or that you did not expect to acquire?

The workload was something she wasn't used to, with lessons in the morning, workshops in the afternoon, and writing reflections or a sort of diary during lessons; she finds it productive but also very demanding. She says that, above all, changing partners during certain activities has enabled her to get to know people better and learn more about their backgrounds.

What learning outcomes did you expect from the programme when you enrolled?

She enjoyed broadening her perspective on urban design and planning, delving a little deeper into ecology, the property sector, and various planning methods to understand which approaches exist and how to plan. So she feels that the course has so far lived up to her expectations.

How do you think you can apply what you have learned in interdisciplinary contexts in the world of work or research?

She would like to work for an urban architecture practice in the Czech Republic, and so be involved in planning. She believes that understanding how to approach participatory planning provides a strong knowledge base that she can apply to planning in her future work.

What interdisciplinary tools or practices do you think you will use in the future (collaboration, design thinking, project management, shared reflection)?

I believe that technical software such as QGIS is genuinely useful for working with data. And, of course, working as part of a team, she believes, is a valuable experience for developing the skills needed to communicate, behave when problems arise, and deal with them.

How was the topic of sustainability integrated into the programme? (environmental/social) Has your perspective on this topic changed since graduating, for example?

Her new perspective on sustainability, like that of many other students, focuses on taking non-human aspects into account in planning, and she wonders whether it is enough simply to consider sustainability within projects, perhaps by incorporating related issues.

Interviews with students

Creative Sustainability Student

Biographical context

The student obtained a bachelor's degree in Automation Engineering from the University of Naples Federico II. She subsequently took part in an exchange programme in Tampere, where she studied management and wrote her undergraduate thesis. She studied Industrial and Management Engineering. Her specialisation is in organisational design and leadership, so she has a strong focus on organisational psychology.

Key phrases and significant insights

My journey has helped me to overcome *marginalisation*. I believe that art students are more inclusive than engineering students, so getting to know them has helped me to overcome a sense of marginalisation that would otherwise have been very strong.

Can you briefly tell me where you come from and Which faculty did you graduate from with a bachelor's degree? Which interdisciplinary course are you currently following?

The student has a background in automation engineering, has studied industrial and management engineering, and is now specialising in organisational design and leadership.

What advantages arise from working with students from different backgrounds (design, architecture, engineering, economics, visual arts)?

What are the most common Challenges you encounter as a student in multicultural/interdisciplinary teams (language, working methods, expectations)?

As an international student, she found it difficult to navigate the bureaucracy at the top and the structural barriers that exist when it comes to actually gaining access to courses at other schools, but once she had overcome this obstacle, which had nothing to do with the people themselves, she had no difficulty at all working with people from different backgrounds. Getting to know the students helped her overcome a sense of marginalisation that would otherwise have been very pronounced.

How do you feel in a group with students from different disciplinary backgrounds?

The student believes that an interdisciplinary approach has helped her break down barriers between local and international students, enabling her to gain experience on university governing bodies and to stand for election to wider student organisations. However, she explains that she tried to bring about change within her own association, without much success, as proficiency in Finnish was required for certain academic matters or activities.

Are there aspects of the programme that you find particularly stimulating or innovative and that have helped you learn more?

The student believes that an interdisciplinary approach has helped her break down barriers between local and international students, enabling her to gain experience on university governing bodies and to stand for election to wider student organisations. However, she explains that she tried to bring about change within her own association, without much success, as proficiency in Finnish was required for certain academic matters or activities. Finally, she emphasises that whilst some international students recognise the problem, others deny it, arguing that it is up to them to learn Finnish.

In her view, however, associations should be inclusive even towards those who have only just arrived in Finland and do not yet know the language.

What interdisciplinary skills or knowledge have surprised you or that you did not expect to acquire?

She began to piece concepts together in unusual ways because they combine ideas that normally remain separate in different fields; she began to combine them because the study is interdisciplinary, so one asks questions that take unexpected turns and begins to think in unexpected ways: this was the first thing she noticed. This led her to a more original way of thinking. At times, she had the impression that the various courses were discussing the same thing, but in a different language.

What learning outcomes did you expect from the programme when you enrolled?

Almost all courses include group activities, both in class and as part of the assignments, which count towards the mark and are carried out in groups.

She argues that approaching one's own course assignments in an interdisciplinary way helps to a certain extent; in her view, however, what helps far more is taking courses in another faculty – something which is, however, much rarer.

How do you think you can apply what you have learned in interdisciplinary contexts in the world of work or research?

Studying engineering gave her confidence and a sense of organisation, but it also robbed her of a greater sensitivity to humanistic issues, making her a little cynical. When she managed to make her CV interdisciplinary, she felt more confident in herself, refusing to conform to labels and preconceptions stemming from her background. She also believes that another key point is to accept oneself more fully without trying to conform to a predefined mould. For example, in the engineering faculty, she always felt a bit out of place because she had a number of characteristics that, culturally speaking, did not align with the other students she was studying alongside, which made her feel insecure.

How was the topic of sustainability integrated into the programme? (environmental/social) Has your perspective on this topic changed since graduating, for example?

What really made a difference for her was the opportunity to teach sustainability courses at various schools. She realised that sustainability can be understood in different ways depending on the academic discipline, but when you simply teach a course to students from different backgrounds, the impact isn't quite as strong.

Interviews with students

Creative Sustainability Student

Biographical context

A student originally from the Philippines, he has been living in Finland for around 10 years. He completed a bachelor's degree in design research at the University of Alta and is now pursuing a master's degree in Creative Sustainability in the interdisciplinary programme focusing on the arts.

Key phrases and significant insights

Being able to work with others, being *flexible*, and being *open* to change help me become more *adaptable* and simply be a better person.

Can you briefly tell me where you come from and Which faculty did you graduate from with a bachelor's degree? Which interdisciplinary course are you currently following?

The student completed their three-year degree in design and is now studying the Creative Sustainability course, as part of the interdisciplinary programme dedicated to the arts, continuing along this path.

What advantages arise from working with students from different backgrounds (design, architecture, engineering, economics, visual arts)?

In terms of the benefits, he feels that it is positive to engage with other disciplines; therefore, interacting with people from the worlds of business or chemical engineering allows him not to focus solely on what he knows, but rather on what he is capable of doing, and to be flexible in the face of change if necessary, especially if he decides to pursue a career that requires those kinds of skills. Being able to work with people, being adaptable and open to change, and learning to be a better person.

What are the most common Challenges you encounter as a student in multicultural/interdisciplinary teams (language, working methods, expectations)?

He cites language as a challenge across different disciplines. For example, the word 'prototype' might have a different meaning for businesspeople. So, in this sense, it is the way they use words. Furthermore, the way they communicate and work with one another can sometimes hinder the message and collaboration.

How do you feel in a group with students from different disciplinary backgrounds?

He says he feels at ease with his colleagues during group work, particularly when tasks are delegated or when knowledge is shared. He would like to see greater collaboration, but he fully understands the dynamics of each team member's commitments, as well as his own; he also places importance on family, work, and life in general.

Are there aspects of the programme that you find particularly stimulating or innovative and that have helped you learn more?

He finds it inspiring to be encouraged and to take the initiative; he believes that this course he is taking has been strategically designed to make students active and indispensable. In his view, this makes it a truly innovative course.

What interdisciplinary skills or knowledge have surprised you or that you did not expect to acquire?

During the first semester, he took an economics course and was very surprised by what he learned, including the financial side of things and how to be more sustainable. For him, it was a completely different perspective from the one he'd always had on sustainability, given that he comes from an artistic background.

What learning outcomes did you expect from the programme when you enrolled?

As this was his first choice after completing his bachelor's degree, he wasn't entirely sure at the outset exactly what to expect; certainly, the approach of devoting a great deal of time to theory and literature is a great source of encouragement to him.

How do you think you can apply what you have learned in interdisciplinary contexts in the world of work or research?

What interdisciplinary tools or practices do you think you will use in the future (collaboration, design thinking, project management, shared reflection)?

He and his colleagues appreciate the skills, mindset, approach and vision for sustainability that he has acquired. He believes that the most obvious path for him after this programme will be research, so he will work in R&D for a company or two. As far as practical applications are concerned, he feels it is still somewhat unclear how to implement them.

How was the topic of sustainability integrated into the programme? (environmental/social) Has your perspective on this topic changed since graduating, for example?

So far, he believes that his view of sustainability has become more abstract because, as in the past, most of the sustainability theories to which he has been exposed have centred on materials research. The longer he follows this programme, the more he realises that sustainability has a greater impact on mindset. This means changing policies and so on, and radically changing who decides what to implement. So he feels that his perspective on sustainability is much more long-term now than it was before he started the programme.

The analysis of the interviews was carried out by dividing the data into student and teacher interviews and consisted of three stages. In the first stage, each interview was recorded and transcribed, faithfully reproducing the questions and answers and highlighting initial interesting and relevant observations. In the thesis, a summary of the responses was drawn up, reorganising the content into a coherent narrative for each question. This step was crucial for reorganising the material and preparing it for a more in-depth analysis. **As a second step, a cross-analysis was carried out**, comparing the responses and reflections from all interviews to identify common ground and differences of opinion. The results of this research were summarised and organised. This made it possible to identify various themes relating to teaching methods and perspectives on interdisciplinarity amongst teachers and students, as well as emotions, past experiences, future plans and behaviours. **The third phase** enabled us to summarise the findings from the interviews and propose structured archetypes: the 'learner personas'. **The analysis began** with the pedagogical approach adopted by teachers, the central theme of this research. Depending on the educational method used, the approaches ranged from innovative teaching methods to student-centred approaches and activities dedicated exclusively to the working group.

Subsequently, the focus shifted to exploring interdisciplinary skills, a key element in directing the analysis towards one of the Confluence module's fundamental characteristics. Interdisciplinarity is, in fact, the central principle underpinning the very design of the teaching module. It was recognised that the interdisciplinary experience is effective when disciplinary boundaries are transcended, as is the case when attending courses at other faculties. This process stimulates original thinking, opening up new avenues of research. **At the same time, teachers** must be consistent and clear in their language in order to create an inclusive environment based on trust. **By exploring** the specific themes of interdisciplinarity and multiculturalism, it has become clear that teachers require teaching methods that value these differences, both in the curriculum and in student learning.

Interdisciplinarity also means overcoming disciplinary barriers, enabling students to integrate diverse forms of knowledge and build a solid, varied learning pathway. However, methodological approaches and linguistic differences sometimes become obstacles to be overcome within working groups.

Indeed, the testimonies reveal that the activities and teaching methods used highlight a student-centred approach to teaching. In particular, the structure of group work is recognised as a fundamental educational element, which can also be transferred beyond the university context.

This approach is reflected in practice through an assessment system that prioritises the use of teaching tools such as portfolios, group presentations and, above all, individual reflection and writing exercises.

The expected learning outcomes, therefore, stem from teaching that focuses on what we teach and why, as well as on the content and methods. The courses aim to develop an interdisciplinary perspective by promoting collaborative experiences with the real world, with a view to understanding how this applies in the professional sphere. At the same time, by spending significant time in an interdisciplinary context, students can make their thinking more flexible, cross-disciplinary, and adaptable to different circumstances.

Consequently, the impact on learning is evident in interdisciplinary collaboration and in the link between research, analysis, and real-life case studies. What students are able to put into practice is discussion, active listening and a greater awareness of the limitations of their own perspective.

The analysis concluded by returning to the theme of sustainability, which forms the backdrop to the entire structure of the Confluences module. It is understood by students and lecturers as a systemic, long-term dimension, more closely linked to changes in mindset, decision-making processes, and policies. Learning about it stems largely from the practical approaches adopted by the lecturer.

Results of Cross Analysis

Pedagogical approach

Teacher & Student

“Understanding how to collaborate creatively and how to link one's own skills with those of others.”
(I., Creative Sustainability).

“One approach we might consider adopting is a student-centred, at least partly design-oriented approach, characterised by innovative teaching methods and closely linked to the skills and approaches required by the world of work.”
(T., Pedagogical expert).

“Activities and exercises are accompanied by extensive use of group work and the flipped classroom approach, made possible by the course's small size. This fosters a more direct relationship and a strongly horizontal approach.”
(A., Creative Sustainability).

“The pedagogical approach of the degree programmes is student-centred and is based on project-based, problem-oriented and experiential methodologies. In this way, students have the opportunity to experience first-hand the contexts in which they operate.”
(C., Urban Studies and Planning).

“Students learn a problem-solving approach that is closely linked to the world of work. They are placed in groups to put this approach into practice and to develop their ability to work in a team. At the same time, they are encouraged to reflect deeply on their own disciplinary background and the influences on their understanding of it. The underlying idea is ‘go and explore, and you will learn through your choices.’”
(N., International Design Business Management).

Advantages and challenges within an interdisciplinary and multicultural context

“In group work, we ensure that each group includes at least one student from each of the three schools.”
(I., Creative Sustainability).

“Students bring their own backgrounds, experiences and cultures to the classroom, actively

contributing to the teaching and learning process.”
(T., Pedagogical expert).

“Deepening my knowledge in my field is essential to gaining a better understanding of other disciplines; this is how I have learnt to understand others.”
(W., Urban Studies and Planning).

“People have helped me to overcome marginalisation. I had no difficulty working with them at all.”
(C., Industrial Engineering, Creative Sustainability).

“Language must not become a barrier between students; for this reason, we seek to encourage a mix of students within the working groups.”
(C., Urban Studies and Planning).

“I believe that communication within a group is challenging: explaining what I intend to do, what my contribution will be, and how I can apply my skills to this project.”
(M., Urban Studies and Planning).

“One challenge I would mention is the use of different languages across disciplines. For example, the word ‘prototype’ might have a different meaning for businesspeople. So, in that sense, it's the way we use words. Furthermore, the way we communicate and work with one another can sometimes hinder the message and collaboration.”
(C., Creative Sustainability).

“It's difficult to bring together different disciplines in this regard. How can I learn from them? How can I pass on that knowledge without bias? It's about understanding how to convey my experience or my idea to someone who hasn't experienced it themselves.”
(F., Product Design, Creative Sustainability).

“The aim is to encourage students to reflect on why they think the way they do and on the factors that shape their understanding of the world. In this regard, diversity – particularly international diversity – takes centre stage, alongside an analysis of how cultural norms and factors influence thought processes. The aim is also to foster immersion in the culture of one's partners, whether they be colleagues or clients.”
(N., International Design Business Management).

“For me, the multicultural aspect lies primarily in experience rather than nationality; I feel that students from abroad may have more work experience.”
(R., Urban Studies and Planning).

Feelings within an interdisciplinary and multicultural context

“I get a positive feeling; I feel safe. Being around students from different backgrounds reduces the sense of competition I often felt during my bachelor's degree. With different disciplines, it's as if everyone brings a different level of knowledge to the table.”
(W., Urban Studies and Planning).

“I'm better able to understand and manage group dynamics, as I've had previous experience working in teams.”
(M., Urban Studies and Planning).

“I don't really feel a strong sense of community.”
(I., Urban Studies and Planning).

“I like different people and cultures because they offer perspectives that are just like mine. I think I learned much more from this than from the course as a whole”
(F., Product Design, Creative Sustainability)

“I come from a very different country and sometimes feel a bit frustrated by the atmosphere around me; it takes me a little longer to appreciate my fellow students and their cultures.”
(F., Urban Studies and Planning).

Teaching activities and methods

“The programme includes projects developed with real-world partners and is based on learning by doing. The aim is to provide students with an interpretative framework through which to think about and analyse phenomena.”
(I., Creative Sustainability).

“All too often, there is a risk of tackling the wrong problem; this is why it is essential to understand its nature. The problem is more important than the solution, because one might propose answers that do not address the root causes. It is precisely for this reason that we seek to place particular emphasis on this aspect.”
(C., Urban Studies and Planning).

“Find out more thanks to the clear instructions.”
(M., Urban Studies and Planning).

“The teachers help us a great deal and, just like them, encourage us to express ourselves more. In short, at the start, I wasn't very confident.”
(F., Economics and Management, Urban Planning).

“Swapping partners during certain activities has enabled me to get to know people better and learn more about their backgrounds.”
(H., Urban Studies and Planning).

“Thinking from a design perspective means carrying out design activities within an interdisciplinary context. People are not expected to already know about design. Indeed, when overly technical or specialist language is used, we seek to make it more accessible and open.”
(A., Creative Sustainability).

“There is also one obvious point: the lecturer must always be very consistent. It is important to explain the use of language clearly and not to assume that certain concepts are more familiar to designers. Teaching should not be aimed solely at those who are already familiar with the field, but also at those who are less so, whilst seeking to apply this content to other academic disciplines, thereby making it even more stimulating. This is a skill that needs to be cultivated and one of which one must be aware, because if the lecturer is consistent and reasonable, a more open learning environment is created.”
(N., International Design Business Management).

Assessment

“Self-assessment is used in some courses, alongside peer assessment. These forms of assessment are also used in group work, as they help to ensure greater fairness.”
(I., Creative Sustainability).

“Students are always required to submit reflective pieces and are guided through this process by specific prompts. The aim is to ensure that reflection becomes an active tool for monitoring and developing their own individual learning objectives, with a greater emphasis on the learning process and peer learning.”
(C., Urban Studies and Planning).

“It challenged my point of view and my perspective; this really surprised me, as I managed to think outside the box by pushing myself.”
(W., Urban Studies and Planning).

“I have developed a greater understanding of how to communicate my qualities and skills. I know who to turn to, who to ask, or when to feel that something needs to be checked by someone else. I think that recognising these moments, within a planning or design process, is also a skill in itself.”
(I., Urban Studies and Planning).

“At the outset, it is necessary to introduce elements that help students learn to work in a group setting by establishing agreed ways of collaborating. For example, what happens if someone is absent or falls ill? Or if a group member drops out of the project? The aim is therefore to develop a sort of ‘group agreement’ on how to work together. As part of this process, students gradually learn to communicate and engage with one another, a fundamental skill for collaborative work.”
(T., Pedagogical expert).

“They are asked to start recording their findings and reflections using dedicated templates or, following a lesson on analysis, to apply what has been discussed straight away. This process is not formally assessed, but it helps ensure that it occurs and consolidates learning.”
(N., International Design Business Management).

Learning outcomes

“Systems thinking, interdisciplinary skills, promoting change, etc..”
(I., Creative Sustainability).

“A teacher should discuss and reflect on what to include and why when planning a course. It is not just about content and methods – that is, how to teach – but rather a broader framework.”
(T., Pedagogical expert).

“A shared vocabulary – in other words, a common language – and the ability to carefully organise a participatory session.”
(A., Creative Sustainability).

“The two workshops aim to address two key learning outcomes of the programme: interdisciplinary collaboration and the link between research and analysis and real-life situations. To achieve this, my colleagues and I do not rely solely on what we teach in our modules, but also coordinate with the other compulsory modules in the programme during the same semester.”
(C., Urban Studies and Planning).

“Students' learning takes place over time; it is a continuous process, comprising both application and reflection. It becomes practical when students can apply and reflect on the concepts. I act as a guide through the various projects and manage expectations. Students can pursue objectives on various scales: social, environmental and economic.”
(N., International Design Business Management).

“The university promotes interdisciplinarity and, in this respect, is described as being very progressive compared to others. Despite this, there are many structural barriers; for example, if you really want to pursue an interdisciplinary degree programme, one such barrier is the difficulty of integrating with Finnish students due to cultural dynamics.”
(C., Industrial Engineering, Creative Sustainability).

“I would have liked to have explored more creativity within the course.”
(M., Urban Studies and Planning).

“I was expecting something more practical.”
(I., Urban Studies and Planning).

Impact on learning

“The link between theory and practice is established at the programme level. For example, in my courses, which combine a strong theoretical component with a practical project, the latter is designed in such a way that students can put what they have learnt during the course into practice.”
(I., Creative Sustainability).

“I've learnt to be flexible, and this is very useful both at work and in communication.”
(M., Urban Planning).

“Being able to work with others, be flexible and open to change, and become a better person.”
(C., Creative Sustainability).

“I've realised that others don't see things the way you do.”
(I., Architecture, Urban Planning).

“I feel I've gained an ever-better understanding of the issues and learnt a great deal, and I find that extremely valuable.”
(R., Business, Creative Sustainability).

“We also ask students, where possible, to engage directly with the area under study, involving residents and users of the context being analysed. Students carry out observations and interviews, and also analyse social media and traditional media, with the aim of understanding the main concerns and needs of the people living in that specific context.”
(C., Urban Studies and Planning).

“I take on the role of the designer and ask: ‘Are you sure this is really the most useful thing to do?’ Listening to what emerges, I propose alternatives, for example: ‘I think it might be more effective to do this rather than that – what do you think?’ From there, a process of discussion and brainstorming begins, through which I take on the role of designer and develop the design process together with others.”
(N., International Design Business Management).

Sustainability

“Sustainability issues are problems that cannot be tackled by individual disciplines alone. People with different skills and backgrounds need to work together collaboratively to address them. The programme, therefore, aims to train professionals capable of linking different areas of expertise.”
(I., Creative Sustainability).

“The lecturer can identify these connections and share them with the students, inviting them to reflect on these aspects together. This is particularly useful as students can draw on experiences from their previous studies or from working in companies, thereby contributing skills and perspectives they have already developed.”
(T., Pedagogical expert).

“I think my view of sustainability is becoming more abstract. The more I follow this programme, the more I realise that sustainability has a greater impact on the way we think. This means changing policies and so on, and radically changing who decides what to implement. So I think my view of sustainability is much more long-term.”
(C., Industrial Engineering, Creative Sustainability).

“I don't feel many positive emotions or a sense of satisfaction. It doesn't seem to me that any ideas have emerged from the courses that can actually be put into practice and that can really change the world.”
(R., Business, Creative Sustainability).

Following the analysis of the interviews, it was possible to collate and summarise the information obtained into structured archetypes. This phase of the research marked the transition from data to character models by developing distinct personalities. 'Personas', better known as 'learner personas' in instructional design (Malamed, 2025), are understood in the literature as fictional archetypes (i.e. they do not represent a real person) and composite archetypes (based on user research within the context of a specific design question).

They therefore represent potential users – archetypes of students – for a project, developed through research into the socio-cultural context, the users' objectives and their behaviour. Personas can be useful for better understanding the user's needs, behaviour, experiences and objectives throughout the design thinking process (ibid.). Focusing on students, personas are helpful to teachers collaborating in co-design processes for students, as they foster empathy towards students, engage the design team in reflecting on the users, facilitate problem definition and decision-making, and fit within the framework of an iterative design process (Kerr & Kelly, 2024b).

The scientific literature proposes two distinct methods for presenting personas: dashboards and narratives. This analysis follows the first method, which presents information on individual personas in tabular form, summarising their personal background and relevant details. Narrative personas, on the other hand, present the content entirely in prose (Weinhandl et al, 2024).

The approach taken was to develop engagement-based personas, based on user research and a synthesis of what was learnt about 'real' users during empathy interviews. Consideration was given to common themes or characteristics observed that may be shared by an entire user group or subgroups. (Malamed, 2025; Nielsen, n.d.). They were designed not specifically to represent users associated with a particular interdisciplinary subject area, but to identify the prevailing characteristics of students taking interdisciplinary courses, whilst taking into account differences in perspective, discipline, culture and geography. The objectives included understanding what they need in terms of teaching tools and practices in order to develop a shared language despite coming from different backgrounds; how they can be involved in interdisciplinary practices; how to guide them through this process; and what they can take away from interdisciplinary teaching.

The analysis was therefore based on the identification of recurring patterns that emerged from the interviews, relating to the ways in which students experience the interdisciplinary and multicultural programme, identifying the benefits and challenges of collaboration, the development of shared working practices, forms of learning assessment, expectations regarding the programme undertaken, and perceptions of its impact on their personal and professional futures. Four profiles were then created; each person was given a name, and specific details were included regarding their objectives, roles, lifestyle, motivations, desires, values, limitations, behavioural patterns, and some fictitious personal details related to their education.

Personas

Etta

Age: 24
Nationality: Swedish

Background: Architecture and Urban Planning
Status: Master's Programme in Urban Studies and Planning
Quote: Deepening my knowledge in my field is essential for gaining a better understanding of other disciplines; this has helped me to understand others.

The young student completed her bachelor's degree in Sweden and decided to move to Finland for her master's, remaining in a geographical and cultural context close to her home country to undertake her postgraduate studies. Throughout her studies, she has always sought to engage in discussion and share ideas, recognising that dialogue helps her to consolidate her disciplinary foundations and gain a deeper understanding of perspectives different from her own. For this reason, she decided to take part in an interdisciplinary course to push herself further and further out of her comfort zone. She feels at ease in this environment and sees it as an opportunity to further enhance her cognitive development.

Goal

She would like to become more confident and skilled at sharing her ideas in language that is understandable even to those outside her field.

Work behaviour

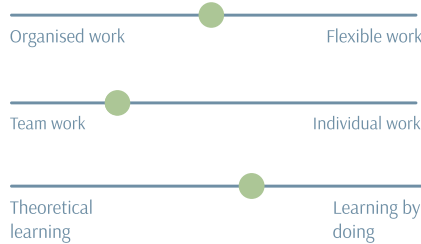
She is a thoughtful person; she thinks things through and observes the situation before speaking or taking a stance. When working in a team, she tries to bridge gaps between different approaches, seeking common ground; she prefers to foster a shared understanding without imposing her own point of view.

Challenges and limitations

She would like to become more confident and skilled at sharing her ideas in language that is understandable even to those outside her field.

Expectations and impact on the future

Dialogue is the aspect that requires the most effort when interacting with others; she would like to continue practising it in both academic and professional contexts in the future.



Valeria

Age: 25
Nationality: Mexican

Background: Product design
Status: Creative Sustainability Master's Programme
Quote: I like different people and cultures, as they have different perspectives, just like me. I think I learn much more from them than from the course as a whole. Valeria is Mexican and completed her bachelor's degree in her home country; for her master's degree, she decided to move to Finland, continuing her design approach from a more sustainability-focused perspective. She has always loved people and different cultures; they make her feel alive, which is why she decided to move to a new country and engage with new perspectives. She also brings a strong cultural identity and deeply held values that she would like to share with the new culture she is encountering, to make her mark and foster cultural exchange.

Goal

Having developed a critical perspective on social and political issues within her own cultural context, she would like to incorporate these into her projects, as she considers them fundamental to sustainable change.

Work behaviour

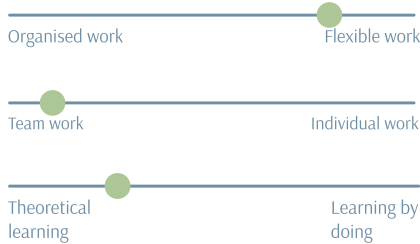
She is constantly engaging with economic and scientific perspectives that help to make her ideas much more concrete; she is able to see the world through different eyes, rather than solely from a designer's point of view.

Challenges and limitations

She believes the biggest challenge is integrating the disciplines in the right way and ensuring they work together. She thinks that translating expertise is the hardest part.

Expectations and impact on the future

Her cultural background encompasses a wide range of transferable and technical skills, including people skills. She has learnt to get on well even with people she doesn't like, as this is all part of the experience.



Veera

Age: 30
Nationality: Finnish

Background: Applied Sciences, Building Architecture
Status: Master's Programme in Urban Studies and Planning
Quote: It always amazes me how much people's ideas can differ from or resemble my own, or differ from one another. Vera is continuing her studies in her home country; she is very enthusiastic and pleased with the path she is following. Thanks to her experience working in teams, she has developed strong organisational skills, a practical approach and clear communication. She welcomes discussion with her classmates and holds them in high regard and admiration.

Goal

What she would like to bring to groups is greater organisation, shared roles, communication and clarity.

Work behaviour

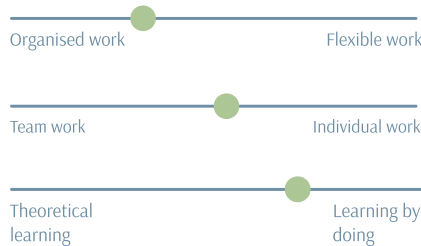
For her, teamwork is an advantage, especially when each member has a clear and shared role. She believes that collaboration yields better insights and tangible results, as working together helps everyone understand the project's objectives and the path to achieving them.

Challenges and limitations

She finds it difficult to cope with very intense periods when the workload becomes overwhelming; in such cases, she prefers to work on her own and then update the team, or to organise the work in advance.

Expectations and impact on the future

She would like to apply these technical and participatory practices, which she is refining, in a work context.



Amin

Age: 23
Nationality: Bangladeshi
Background: Urban and Regional Planning
Status: Master's Programme in Urban Studies and Planning
Quote: It is beneficial to connect with students from different academic disciplines, particularly when it comes to collaborative projects.

When Amin moved to another country, he was exposed to different perspectives and approaches; he immediately found this very interesting for his career. He sees interdisciplinarity as an opportunity to integrate theoretical and practical knowledge and develop a greater understanding of contemporary challenges.

Goal

He would like to become more confident and skilled at sharing her ideas in language that is understandable even to those outside her field.

Work behaviour

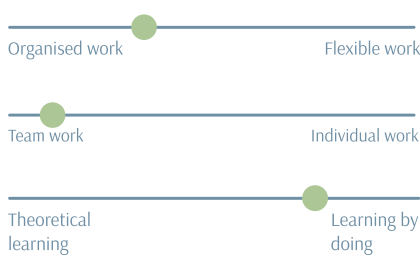
He always tries to combine theory and practice in his work. Once he has grasped the concepts, he prefers to put them into practice using technical tools and gain a better understanding of the work from his colleagues' perspective.

Challenges and limitations

At first, understanding a technical language other than his own can be a bit challenging, but with practice and the help of colleagues and teachers, he is very keen to carry on.

Expectations and impact on the future

In his future work, he believes it is an important skill to continue taking on board ideas from colleagues or prospective clients to understand what they are trying to say, then reflect on their insights and implement a solution.



The personas that have emerged highlight that students are embarking on an interdisciplinary and multicultural journey characterised by a range of attitudes, personalities and approaches. Interdisciplinarity is seen as an opportunity for personal growth, both for their future academic career and for the world of work. Teamwork, discussion and flexibility are key skills that every student acquires and would like to retain in the future, even in other contexts. Developing a shared language becomes the greatest challenge; the difficulty of communicating across different disciplinary languages, experiences and cultural references becomes apparent.

This gives them the ability to demonstrate their skills, explain technical concepts and understand different ways of working. Bearing this challenge in mind, students strive to strike a balance between their personal identity, through which they express values and sensibilities that might prove helpful in a situation requiring discussion, and their professional role.

Co-design of the module

This module will address *water-related* challenges in the context of climate change and will focus on *re-evaluating* urban water resources (rivers, bays, lakes) as culturally embedded elements and providers of *ecosystem services* for a resilient urban future.

WP1- Exchange knowledge on urban river pedagogies 8.1

The first work package (WP1) of the QUORUM project established a methodology for developing a shared lexicon, thereby facilitating interdisciplinary collaboration by identifying strengths, critical issues, and key concepts. This methodology was designed to support the development of a module that addresses the complex challenges posed by rivers in urban environments under uncertain conditions. Analysis of pedagogical approaches adopted by partner universities, together with the exchange of these methods as described in Chapter Six, led to the creation of a glossary contextualising the shared case studies. The findings were mapped to pedagogical strategies, teaching methods, learning activities, and assessment practices. The resulting categories included interdisciplinarity, multiculturalism, and collaboration (first group); pedagogical approaches, learning outcomes, timetables and durations, methods and activities, technologies, assessment, and outputs (second group); and challenges (third group). Recognising the importance of academic disci-

plines, the project engaged all relevant fields, directly or indirectly, in exploring urban rivers and ecosystem services. The identified disciplines included urban planning, architecture, landscape architecture, urban design, lighting engineering, environmental engineering (addressing technical and environmental requirements), ecology, sociology, participatory design, geography (for understanding water context and climatic conditions), history (for tracing the evolution of urban contexts and river relationships, as well as understanding cyclical rhythms), mathematics, physics, computer science (for modeling and scenario analysis of rising water levels), the arts, and linguistics (to foster imagination, ideation, expression, and creation). To address multiculturalism, the project considered participants' countries of origin, languages, and specific needs, designating English as the lingua franca. Team formation was structured to prioritise diversity, thereby facilitating dialogue, mutual support, well-being, and the clear allocation of roles and responsibilities.

The first group concluded its work through collaborative activities that engaged students in topics integrating multiple disciplines and encompassing diverse geographical contexts.

For the second group, several pedagogical approaches were identified for individual or combined application. These approaches included learning by doing, project-based learning, problem-solving, laboratory-based learning, final projects, experiential learning, critical pedagogy, role-play and simulated learning, collaborative learning, and inquiry-based learning. The learning outcomes of courses delivered by the QUORUM team to students from various disciplines and cultural backgrounds were compared. Common elements included research, foundational principles, analysis, critical thinking, application, creation, interdisciplinary collaboration, and the development of best practices related to knowledge, skills, and values. Differences primarily concerned the selection of themes and topics: some courses focused on discipline-specific content, such as lighting or urban design, while others introduced cross-cutting themes that transcended disciplinary boundaries.

Subsequent discussions focused on project implementation, considering two options: a one-semester project divided into individual or guided activities in the first half and group work in the second half, or a semester-long project structured around intermediate stages. The advantages and disadvantages of both approaches were analysed in relation to interdisciplinary and multicultural learning. The first approach enables students to gradually become familiar with cultural and disciplinary contexts before engaging in group work. In contrast, the second approach facilitates adaptation and the development of shared understanding directly within teams, thereby fostering collaborative dynamics.

Regarding team organisation, two approaches were considered: pre-assigning teams by instructors based on students' subject areas, or establishing criteria that allow students to form their own teams.

Organising and analysing visits to study areas were identified as essential activities for establishing a direct connection with the subject of study.

Developing a shared understanding, recognised as a primary challenge in interdisciplinary programs, was addressed through multiple methods. The use of keywords facilitated this process. Effective technological tools included collaborative online noticeboards, open-access digital resources, and institutional learning platforms.

The assessment discussion focused on the roles of individuals involved in the process. Emphasis was placed on integrating instructor assessment with student self-assessment and peer feedback, as outlined by Professor Arnold Pears' pedagogical practices in Chapter Five, to promote comprehensive reflection on the learning process.

The study found that there is no universal standard for final assignments; formats vary according to the specific objectives of each course. Formats identified in practice included written reports, presentations, poster presentations, debates, posters, applications, leaflets, newsletters, and magazines.

The final group of challenges, identified through team experience, included managing expectations, establishing a common vocabulary, prioritizing the needs of the subject under study over those of participants, constructively addressing misunderstandings and conflicts, supporting students in communication – particularly data visualization – learning to use software for data analysis, organizing spaces to assist with technical aspects, motivating students, and addressing regulations and concerns related to data privacy in teaching.

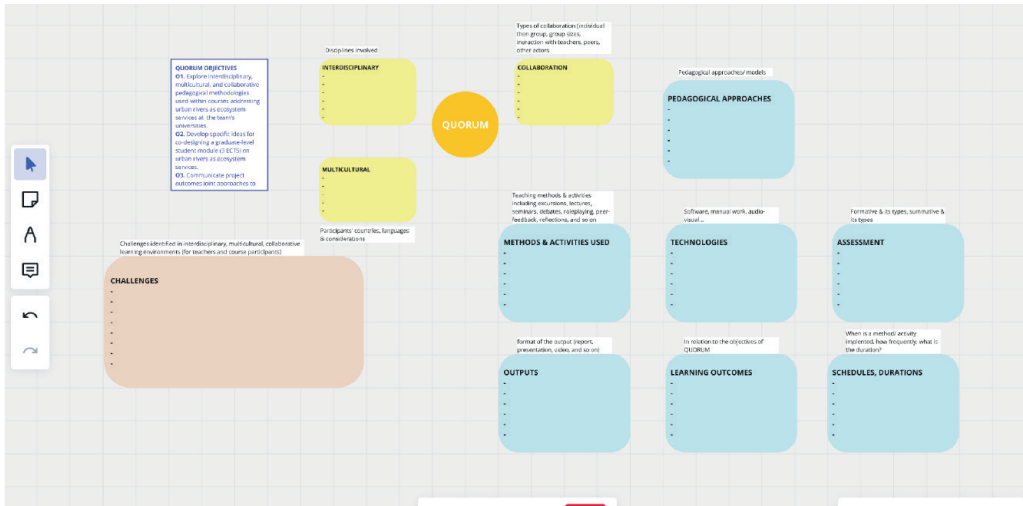


Figure 54. The team's presentations redistributed to categories using Miro board. (QUORUM team, 2026)

Building on this initial grouping, the next step was to list ten terms that the project team considered important in interdisciplinary and multicultural education and, where applicable, in relation to urban rivers. Some terms focused on pedagogical aspects, disciplinary requirements, project characteristics, ecological aspects, or engineering-related issues. The terms were analysed and reorganised into five categories: elements, processes, factors, challenges, and opportunities.



Figure 55. Combining terms and categorising them using Miro board. (QUORUM team, 2026)

CM	AB	PP	AP	AC	EC
Teamworking	Water	Light pollution	Project and problem-based learning	River section	Ecosystem services
Communication	River (Urban river)	Adaptive lighting	Challenge based pedagogy	Riverfronts	Sport
Strategy	Ecosystem services	Integrative lighting	Constructive alignment	Green infrastructure	Biocenosis
Data- based	Participation	Artificial light at night (ALAN)	Social constructivism	Accessibility	Riparian vegetation
Decisionmaking	City/urban	Sustainable lighting	Modelling and open-ended projects	Ecosystem services	Water quality
Participation	Data	Illuminance	Student-centric co-design	Connectivity	Sampling
Mixed-methods	Plan	Luminance	Urban landscapes	System vs place	Hydraulic risk
Peer-learning		Energy efficiency	Comparative judgment	Strategy	Mini hydroelectric
Observation		Lighting control	Value systems and educational value system modelling	Process	Flooding
Critical thinking		Visual perception		Urban project	Environmental Monitoring
				Idea(concept	
				Urban role/urbanity	

Figure 56. The ten terms per team member compared. (QUORUM team, 2026)

Based on the identified terms, interdisciplinary and multicultural learning processes occur in four general stages, as reflected in pedagogical and subject-specific glossaries: understanding the problem/context, designing solutions, testing/evaluating solutions, and iteration. The next step involved reviewing the educational literature on five key themes underpinning interdisciplinary and multicultural learning about urban rivers: trends in interdisciplinary education; problem-solving methods fundamental to the QUORUM module; disciplinary approaches and methods; emerging approaches; and urban rivers and ecosystem services.

The literature was analysed to define the case study's structure and to develop a specific pedagogy for addressing complex urban water-related challenges. The learning experience is designed to support students' development of skills for interdisciplinary and multicultural learning. It is hypothesised that this experience will enhance students' ability to understand and address water-related challenges in the context of climate change and uncertain environments. From these two steps that made up WP1, the key areas that emerged – and which will be addressed throughout the Work Packages – were:

Creating a safe, collaborative learning environment that encompasses cultural and linguistic aspects

Maintaining students' motivation and fostering proactive learning, in which diversity is valued

Using classroom-based learning to stimulate creativity through exposure to different perspectives and engagement in various practical activities, collaborative critique and design-based inquiry

To promote reflection and inclusion across disciplines and cultures through physical or digital tools

To adopt a shared vocabulary across disciplines and cultures, with particular attention to the perspective of the river as an active agent (supported by 'essential', 'desirable' and 'useful' knowledge, skills and values)

Jointly define the urban river problem, supported by context-specific awareness-raising, various case studies and disciplinary perspectives.

Use mapping and visioning exercises, and highlight the river as an active agent in problem-solving (QUORUM, UNITE!, 2026, Appendix 1).

WP2 – Co-design the urban rivers module

8.2

The starting point for WP2 was to develop a collective capacity to address complex problem situations through effective management of the learning environment. This was achieved by creating authentic, appropriate, and relevant contexts for the exchange of skills and knowledge across disciplines and cultures. This phase began by identifying and articulating the intended learning outcomes (ILOs):

To develop a common language and shared vocabulary within which their disciplines can communicate effectively about the problem space.

Experiment with student-centred approaches to defining and tackling ill-defined problems and self-defined objectives.

Establish a personal connection and develop a personal perspective on the role of their discipline within the holistic context.

Draw on the skills inherent in their own disciplines and cultures (personal stories) to create synergies in the design process.

The aim was to develop a design solution that leverages the collective experience of each project team member and demonstrates the achievement of the intended learning outcomes. To begin developing the teaching module, it was proposed to carry out:

A single-structured activity: communicating and working from a subject-specific perspective, asking each participant to outline their own individual learning objectives

A multi-structured activity: working with multiple facets to make connections and educate across disciplines.

Introducing the theme of urban rivers, values and attitudes, and interaction with the context (in the first instance, this will focus on the River Po in Turin)

Communicating a shared vision, strategy and plan to address the desired future of the selected urban river

As part of WP2, various aspects of course design were discussed. These included content, materials, and workload; selected teaching methods (such as lectures and flipped classroom) and delivery modes (on-site, face-to-face, online, hybrid); teaching activities, assignments, expected outcomes; and assessment and feedback mechanisms. During the first meeting, held in June 2025 in Turin, the River Po was used as a case study and presented to students from a range of disciplinary and cultural backgrounds. The programme also included site visits and activities designed to raise participants' awareness of the challenges facing urban rivers (QUORUM, UNITE!, 2026, Appendix 1).

Workshop at the Politecnico di Torino for the co-design of the module

8.2.1

The meeting held in Turin on 16 and 17 June 2025 was attended by the seven team members, a PhD researcher and a Master's student from the Politecnico di Torino, and involved seven PoliTo students from various disciplines. Through collaborative design sessions involving students from different disciplines and lecturers from European universities, the initiative translated the theoretical results of WP1 into concrete learning experiences. The in-person workshop was organised to co-design a shared teaching module within the framework of the UNITE! European University Alliance. Over the course of the two days, participants worked together to define:

- The module's learning objectives,
 - The course format and structure,
 - The content and teaching materials,
 - The teaching and learning methods,
 - The assessment criteria and feedback procedures
- The aim of the first day of the workshop was to gather useful ideas for the joint design of the module. Materials were prepared to facilitate the activity, including topic-organised worksheets for both teachers and pupils, on which all ideas could be recorded.

- The worksheets for teachers contained open-ended questions on:
- The link between their own subject and the module's theme,
 - The teaching methods and tools used,
 - Proposals for interdisciplinary activities,
 - Assessment methods consistent with the UNITE! approach
 - Expected outcomes
 - The importance of collaboration and interdisciplinarity
 - The type of course



Figure 57. Photograph by the author, Panoramic photo of the meeting room with equipment, 2025.



unite!

University Network for Innovation,
Technology and Engineering

QUORUM PROJECT

Teachers

Torino



Course name <i>Title and description.</i> <i>Try exploring and combining the</i> <i>expertises on the table or adapt an</i> <i>existing course</i>	Collaboration partners <i>Who will organise and run the course?</i> <i>Is it possible to use your own institutions in</i> <i>the exercise?</i> <i>How is teaching planned?</i>	Added-value of the collaboration <i>How does the parther benefit?</i> <i>How do the students benefit?</i> <i>What is unique about this course?</i>	Teaching methods <i>What is the format of teaching and learning?</i> <i>Explore methods that showcase the course's</i> <i>internationality</i>	M&M <i>My students come from diverse</i> <i>backgrounds, how will I take into account?</i> <i>How will we facilitate the students'</i> <i>onboarding/groupwork/multicultura</i> <i>I lernaning by...</i>
	Intended learning oucomes <i>After this course, the students will be able</i> <i>to...?</i>		Assessment <i>How will learning be demonstrated in the course?</i> <i>Are the methods compatible with the course format?</i>	Networking <i>How we can sharing material and promote internal</i> <i>communication?</i>
Course type, how many credits, estimated numebr of students <i>How will the course be implemented?</i> <i>BIP, COIL, Parallel Teaching, something</i> <i>esie?</i>		Teaching tools/ learning environments <i>What tools/environments do I need for teaching</i> <i>and assessing?</i> <i>Are my tools/environments accessible to students</i> <i>of all participating instructions?</i> <i>Are licenses required, is this a safe tool/</i> <i>environment, etc?</i>		

Adapted from document of Aalto Erasmus + Staff Training 4/5-06 2025

Workshop
15/16-06

Figure 58. Teachers Workshop Template. (QUORUM Project, 2025)



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University Network for Innovation,
Technology and Engineering

QUORUM PROJECT

Students

Torino



Aalto-yliopisto
Åalto-universitetet
Aalto University



Politecnico
di Torino



KTH
KTHNORD
KTHNORTH



LISBOA



UNIVERSITAT POLITÈCNICA
DE CATALUNYA
BARCELONATECH

Course name Attractive title and description	Collaboration partners Do you envisage carrying out part of the activities at your school or institution? How would you like the lessons to be conducted (online, in person, in groups, etc.)?	Added-value of the collaboration What are the advantages for students? What makes this course unique? What topics could be covered?	Teaching methods How would you like the teaching to be organised? Does it take place online, in person or in another way? Have you noticed any methods or activities that highlight the international aspect of the course (such as working with students from other countries, language content, global issues, etc.)?	M&M What can I learn from students/working groups who come from different backgrounds? (collaborative approach)
	Intended learning outcomes After this course, what will I expect to have learned?		Assessment Which assessment methods do you think are consistent with the course objectives? How do you feel you are assessed fairly (in a way that truly reflects what you have learned)?	Networking How we can sharing material and promote internal communication?
Course type, how many credits, estimated numebr of students How will the course be implemented? BIP, COIL, Parallel Teaching, something esle?	Teaching tools/ learning environments Do you have everything you need (tools or online platforms) to follow the lessons and complete the activities?Do the tools or platforms you use work well for you and your classmates? Do you need to create an account, install something, or agree to any terms? Do these tools seem safe to use?			

Adapted from document of Aalto Erasmus + Staff Training 4/5-06 2025

Workshop
15/16-06

Figure 59. Students Workshop Template. (QUORUM Project, 2025)

Prior to compiling the worksheets, the team attended a presentation by Professor Arnold Pears that addressed key themes essential to understanding the value of an evidence-based approach to teaching and curriculum design. This session was considered essential for providing project members with a shared foundation in pedagogical knowledge and for supporting the development of the teaching module. The lecturer completed their own questionnaire, and the initial results, which were also broken down by category, were as follows:

The following course titles emerged:

A disciplinary perspective on urban river systems “and “ We dive into the river”. A multidisciplinary approach and an immersive experience centred on sustainable ecosystem services for urban rivers also emerged; ‘Urban Rivers’: currents of change towards resilience, vibrant rivers and cities, with a view to a sustainable urban future and future resilience. ‘River Escape’ and ‘Urban Rivers in the 22nd Century’ aim to transcend the boundaries of the urban rivers of the future, whilst ‘Sounds and Colours of Urban Rivers’, together with ‘Urban Rivers, Water, Watercourses, Paths and Walks’, lead to the guiding question: ‘What can I see?’

Collaborating partners:

An opportunity has arisen to involve the participants’ institutions in the exercise alongside a host university. The plan is to structure the teaching as a residential course supplemented by face-to-face workshops at one of the partner institutions and to organise it as an optional BIP with an annual teaching programme. There are plans to involve river clubs (cultural and sporting), associations and third-sector organisations.

Added value of the collaboration:

The partners benefited from sharing a common value, which emerged from the exchange of knowledge and experience. It was anticipated that students would benefit by developing open-mindedness, gaining opportunities to engage with unfamiliar contexts, and reflecting on complex issues that integrate space, life, and time within specific contexts.

Teaching methods:

The course included face-to-face and online lessons, activities in study areas, group work, tutorial sessions and project-based learning.

M&M (Multiculturalism and Multilingualism):

The learning process involved working in mixed-group settings, accompanied by social activities designed to encourage the comparison of terminology across different languages, interaction, and an understanding of the value of different contexts based on past experiences. Particular attention was paid to ‘icebreaker’ activities, designed to highlight cultural similarities and differences and to develop a shared vocabulary that emphasises the differences and similarities among participants.

Course type, credits, estimated number of students:

Discussions have taken place regarding how to deliver the course using various teaching methods, including BIP, COIL, parallel teaching, and other hybrid approaches. The course could be worth between 5 and 10 ECTS credits and have an estimated enrolment of 30–50 students, or be structured as a selective BIP, held during the summer. It could also take a hybrid format combining online and face-to-face teaching, as well as different BIP structures with credits ranging from 3, 6 to 12 ECTS.

Expected learning outcomes:

By the end of the course, students are expected to improve their ability to observe, reflect, discuss, and share their ideas; listen to and understand others’ points of view; and develop solutions through open dialogue. They will develop the ability to use interdisciplinary vocabulary and to think visually, whilst strengthening their critical thinking regarding the role of their own discipline within the field of study. They will be able to discuss issues relating to urban rivers by integrating the various disciplines involved and propose interdisciplinary objectives and solutions to the challenges associated with urban river systems.

Assessment methods:

It is envisaged that work will be assessed through group oral presentations that evaluate the ability to communicate ideas and engage others, and through outputs such as artefacts or posters to represent and explain methodologies and assessment processes. The course could include daily progress reviews and reflections, as well as a final public presentation with stakeholders.

Networking:

Platforms such as Teams and other online workspaces can facilitate collaboration. Communication could also be supported by face-to-face meetings, whilst Telegram or WhatsApp groups could be used for operational and informal management; information could also be disseminated via the websites of the respective partner universities or via a shared mailing list.

The students from the Politecnico di Torino who were involved came from various degree programmes, including Environmental Engineering, Design, Architecture, and Hydraulic Engineering. The student questionnaires were slightly modified and designed to cover:

**Their expectations regarding the course,
Their previous learning experiences,
Their needs in terms of support and feedback,
Their interest in innovative or collaborative teaching approaches**

The results emerged during the final phase of the afternoon activities. As part of the afternoon workshop with the students, they were asked to share photographs that represented the personal significance of an urban river and to reflect on the added value that this natural feature holds for them. This exercise enabled them to explore not only the vocabulary related to the topic, but also the individual motivations that led them to take part in the course.

The afternoon sessions had this structure:

Opening of the session – 10 minutes. Presentation of the UNITE! project and the workshop's objectives by Professors Arnold Pears and Andrea Botero.

Personal introductions and ice-breaker activities – 45 minutes. Circle activity involving the sharing of a personal photo. Each participant introduced themselves through their chosen image, and keywords were noted down on Post-it notes based on the stories that emerged.

Interdisciplinary exploration – 20 minutes. The images were laid out on a shared table. Each lecturer selected three images that aroused the most interest. Three groups were formed based on these choices, leading to a discussion on the links with their respective disciplines.

Visions for the future of urban rivers – 20 minutes. A new set of images was laid out on the table. Each participant presented their vision of a desirable future for urban rivers.

Co-designing the course in pairs – 20 minutes. Discussion in pairs (with a different partner each time) on the elements listed on the student worksheets. The pairs' findings were shared with the whole group via the Mentimeter platform.

For phase 2, the keywords that emerged were:

**Love along the river
Meeting people by the river
Heritage site childhood
Reclaiming
Nature
A place to be sailing safely
Re-meeting my city from the river
Hiding with my friends by the river
Rivers shape the city
Being outside the city**

The shared photos were pinned to the same noticeboard, linked to the participants' names, thus beginning to create a visual map of identities and emerging themes. For phase 3, each group then drew up a thematic glossary based on the discussion and presented a summary of the work carried out. All the results were displayed on the noticeboard to provide a clear, comprehensive and exhaustive overview of the work carried out and the results achieved.

Element	Content	Group 1
Composition	• Lecturers in design, lighting technology, electrical engineering and urban planning • Design and engineering students	
Outcomes – Well-being and connection	• A sense of well-being and connection as a central element • Focus on people's perception of watercourses • Rivers understood as complex infrastructure systems	
Outcomes – Environmental issues	• Presence of artificial banks • Impact of pollution on the river ecosystem	
Outcomes – Tangible and intangible aspects	• Analysis of tangible and intangible aspects • The dichotomy between the natural and the artificial • The role of time and resources in defining habitats, form and morphology	
Outcomes – Management and innovation	• The importance of data collection • The role of technological innovation • Active community participation	
Outcomes – Environmental aspect	• Outcomes – Environmental aspect • Attention to non-human life and regeneration processes • Monitoring of temperature and microclimate • The need for a multidimensional understanding of the river system	

Figure 60. Students Workshop Template. (QUORUM Project, 2025)

Element	Content	Group 2
Composition	• Lecturers in applied ecology, environmental engineering and urban design • Students of design and water engineering	
Outcomes – Urban design	• Analysis of proportion and scale • Attention to materiality • The importance of design • Focus on the human experience and the creation of space • Data collection, idea development and the use of simulations as key tools	
Outcomes – Systemic design	• The importance of the project life cycle (Life Cycle Assessment) • Sustainability education • The use of renewable energy • Links between ecosystems, society and the environment • The central role of ecosystem services	
Outcomes – Water resources engineering	• Energy-related issues • Interconnection of systems • Management of water-related food resources • Data integration for project development • Use of simulations to improve water resource management	
Outcomes – Environmental engineering	• The importance of data collection • The role of technological innovation • Active community participation	
Outcomes – Environmental aspect	• Monitoring of environmental quality • Use of bioindicators to assess the health of ecosystems • Development of design solutions aimed at environmental protection • Consideration of flora, fauna and human factors	

Figure 61. Students Workshop Template. (QUORUM Project, 2025)

Element	Content	Group 3
Composition	• Lecturers in engineering, education, architecture and design • Students of design and environmental engineering	
Outcomes –Visual, conceptual and systemic analysis	• Exploring the water cycle • The relationship between rivers, the local area and communities • Using sticky notes, keywords and images to map concepts • Key concepts: distribution, storage, regeneration, chaos, energy, pollution, control, memory, nature, infrastructure	
Outcomes – Case studies and historical reflections	• Images of real places (e.g. the Yarra River, Melbourne; Florence) • Discussion of tensions and conflicts • Rivers as living resources and as technical and social challenges • Implications for energy, industry, flood risk and the urban landscape	
Outcomes –Human and non-human dialogue	• The need for modules on participatory resource management • Assessment of project alternatives • The role of local communities • The relationship between nature and infrastructure • Integration of scientific, technical and humanistic approaches	
Outcomes – Management and innovation	• The importance of data collection • The role of technological innovation • Active community participation	
Outcomes – Course structure	• The need for modules on participatory resource management • Assessment of project alternatives • The role of local communities • The relationship between nature and infrastructure • Integration of scientific, technical and humanistic approaches	

Figure 62. Students Workshop Template. (QUORUM Project, 2025)



Figure 63. Photograph by the author, Workshop session with students, 2025.

For phase 4, a new set of images was laid out on the table as a visual stimulus to prompt collective reflection. Each participant shared their vision of a desirable future for urban rivers, focusing on how a course dedicated to this topic might be structured and on which elements are missing or needed to make that desired future a reality.

The reflections that emerged further enriched the co-design process and led to the identification of further keywords:

River (is or as) a mix of science, society, sport

A liveable place

Coexistence

Po River: Valorisation

Connected to nature

Restore and connection

Cristal water

Connection (social connection, engineering connection)

Shore agreement

Equal access

Aggregation of social activities

Integration with identity

Reclaiming -Realistic structure



Figure 64. Photograph by the author, Workshop session with students, 2025.

Finally, Phase 5 revealed the following results from the student-teacher pairs.

Proposed titles and subtitles for the course on urban rivers:

Urban Rivers: The Flow of the Future – 6 people

Water Flows: Co-designing Futures for Urban Rivers – 4 people

Let Them Be: Urban Rivers for All – 3 people

The Future of Urban Rivers: An Interdisciplinary Approach – 3 people

Future Rivers: Holistic Management of Waterscapes – 3 people

Urban Rivers: Interdisciplinary Collaborative Futures – 2 people

Sustainable Rivers: Exploring Coexistence – 3 people

Urban River Futures – 1 person

Preferred evaluation methods:

Presentations to different stakeholders.

Discussions and video presentations.

Assessment through portfolios and interdisciplinary projects.

Group exams and oral presentations.

Practical projects, such as planning the redevelopment of an urban river.

Short documentaries with factual data.

Simulations of possible futures and group discussions.

Involvement of external juries and local users.

Report writing and field visits.

Networking tools among participants:

WhatsApp as the main tool.

LinkedIn for professional connections.

Informal meetings such as pub/coffee gatherings.

Instagram for visual interactions.

Mailing lists and newsletters for regular updates.

Telegram and email for additional communication.

Periodic meetings.

Preferred educational activities:

Practical projects and group work.

Involvement of external experts and interactive lectures.

Field visits and hands-on activities.

Study of real cases and brainstorming.

Independent exploration and interdisciplinary competitions.

Meetings with the community and future users.

Production of documentaries and interdisciplinary work.

Masterclasses and hackathons for innovative solutions / Tutorials / Discussions / Presentations.

On the second day of the workshop, an activity was organised at the CUS in Turin to involve project partners in a practical experience on the River Po. The activity consisted of a dragon boat trip along the river, lasting approximately 45–50 minutes. This experience enabled participants to engage directly with the river, observe the vegetation closely, and discover the area's natural resources. The aim was not only to provide direct experience of the River Po, allowing participants to become familiar with an urban river, but also to simulate the collaborative dynamics fundamental to teamwork. Paddling a dragon boat required coordination, attentive listening, and the ability to adapt to a shared rhythm. The activity highlighted the importance of incorporating similar shared experiences and teamwork into the course, which can strengthen both interpersonal dynamics and the learning process.

After the dragon boat trip, the visit continued at the CUS Torino headquarters, where participants examined the available activities and facilities. Following the experience at CUS Torino, the workshop concluded with a debriefing and discussion session. During this session, the workshop's findings were reviewed, with participants reflecting on the insights gained and potential future directions. The meeting also served as an opportunity to plan the next operational steps and schedule upcoming meetings with the partners involved. The workshop then transformed the pedagogical reflections and practices identified in WP1 into concrete co-design activities, directly involving teachers and pupils in collaborative exercises and immersive experiences on the river. Following the workshop, the team continued to meet monthly to develop the teaching module.



Figure 65. Photograph by the author, Dragon Boat with QUORUM team, 2025.

The team worked on:

Developing the module plan: based on the workshop's outcomes, the aim was to have a complete draft of the programme by December 2025.

Review of possible formats: assessment of options for implementing the module within universities (e.g. BIP – Blended Intensive Programme), with particular attention to the requirements and deadlines of the Erasmus call for proposals. In particular, the following issues were addressed: differing enrolment periods across universities, varying academic calendars, coordination among international offices, and Erasmus+ mobility requirements specific to each department. Each stage was discussed within the team and separately with the offices of the respective home universities to ensure coordination was as clear and seamless as possible.

Erasmus BIP proposal: to assess the submission of an Erasmus application for a dedicated BIP, which would enable the module to be institutionalised within the universities.

Expected learning outcomes: Building on the expected learning outcomes identified during the Turin workshop and the shared reflections on the value of collaboration, the QUORUM team conducted an in-depth analysis to define the ILOs (expected learning outcomes) for the module.

This work enabled the team to focus on the key elements of the training course and to develop a series of examples to guide the module's design (QUORUM, UNITE!, 2026, Appendix 3).

Discussion on the course format

8.2.2

Immediately following the workshop, held in Turin, attention turned to the course format based on the findings that had emerged. The discussion began with an analysis of the programme formats best suited to the Quorum context, including the BIP (Blended Intensive Programme) and COIL (Collaborative Online International Learning) methods, as well as the possibility of organising the initiative as a Summer School or Winter School. All these methods enable students to engage with diverse cultural and academic contexts, combining physical mobility with online collaboration, both of which facilitate immersive activities that tackle real-world problems. BIPs (Blended Intensive Programmes) integrate online work with an intensive face-to-face phase, organised as a project workshop. This format fosters collaboration between students from different countries, encourages the co-creation of solutions and promotes experiential learning. COIL (Collaborative Online International Learning) enables students to take part in joint teaching programmes between two or more universities, working remotely (entirely online) on shared projects. Summer Schools offer an intensive, multidisciplinary

nary and interactive environment in which students can explore specific topics in depth through workshops, lectures and fieldwork. During discussions with team members, the idea emerged of a two-week intensive course organised in various formats, such as an optional summer course integrated with a preceding online period structured as a virtual module within a BIP. As an alternative, it was proposed that the entire course could be structured as a semester-long course with one week of face-to-face teaching, suitable as a BIP. Both proposals offer a combination of online and face-to-face teaching. Looking in more detail at the course structure, operational aspects were discussed, such as duration, budget, the required number of participants, and alignment with the structure, which requires at least 3 ECTS credits, as stipulated for blended intensive programmes. It was emphasised that the budget available to students would cover the costs of one week of face-to-face activities; consequently, a training programme comprising 40 hours of online learning spread over the semester, accompanied by 40 hours of face-to-face sessions – ideally organised at one of the QUORUM team's venues – was proposed.

Furthermore, the possibility of rotating the physical venue over the course of the three-year programme was discussed, with a view to promoting the various partner institutions. Above all, the plan is to maintain the programme for at least the next two or three years. As regards the actual launch of the programme, the group identified the 2026–2027 academic year as the most realistic timeframe, as it would allow sufficient time for planning, internal approval, and coordination among the participating universities. As for the number of students, it was deemed appropriate to envisage a group of 15–20 participants, which could be expanded depending on available space and the logistical capacity of the individual universities. The possibility of setting a limit of 3–5 students per university was discussed, with the need to establish agreed-upon selection criteria. Another aspect that was clarified during the meetings concerned the group of students to be involved. Initially, the question arose as to whether the course should be reserved exclusively for students participating in QUORUM activities or also extended to the UNITE alliance. Finally, a number of essential requirements for the host venue were identified: teaching rooms, meeting rooms, exhibition areas and, if possible,

suitable spaces for workshops, group work and final presentations. The discussion on these topics made it possible to clearly outline the initial possible structures of the course, identifying key elements and critical issues to be explored during the planning stages. The steps included Verifying the specific requirements of the BIP within the respective universities. Assessing how the QUORUM module can be effectively integrated into the teaching structures of the various partner universities (as an optional module, an interdisciplinary course, or part of a master's or bachelor's degree programme). Working collectively to define the module's Intended Learning Outcomes (ILOs). Alongside defining learning objectives, it is important to clarify each university's individual contributions to the module's co-design. Roles should be allocated according to theoretical content, the organisation of practical activities, workshops, field trips and methodological experiences, with a view to achieving a balanced distribution that makes the most of each team member's specific expertise, whilst ensuring coherent and interdisciplinary teaching (QUORUM, UNITE!, 2026, Appendix 3).

Individual contributions and preliminary structure of the module

8.2.3

As the co-design phase of the QUORUM module progressed, the individual contributions of the partners and the module's initial overall structure played a key role. The work drew on content that had emerged from previous project activities, particularly the results of WP1, and incorporated the theoretical and methodological considerations discussed during the workshops and planning meetings.

The 'ring model' – the model of concentric rings presented during the Turin workshop by Professor Arnold Pears – was adopted once again. This model illustrates the three main objectives of research in the field of education:

Contribute insight

Understand learning

Improve practice

This model highlights how effective teaching stems not only from experience but from continuous reflection supported by data and theory. It is not just a matter of 'teaching', but also of:

Understanding students' needs

Integrating research, theory and context

Planning methodically and assessing using appropriate tools.

This approach enables students to develop solid, lasting skills that are also useful for tackling complex real-world problems.

Contribute insight

This first point concerns the development of new theories, data and analyses that expand knowledge in the field of education. The aim is to provide innovative insights into how learning takes place and which variables influence teaching effectiveness. In this case, students will be introduced to various concepts as part of a multidisciplinary approach aimed at understanding and solving problems related to urban rivers (QUORUM, UNITE!, 2026, Appendix 3). The objective has been expanded from an eco-design perspective to provide resources for both online and face-to-face delivery of the module. For the online component, it was decided to begin by creating an initial concept map describing the river. The first thematic area focused on river ecology and was described using key terms. Among the main concepts that emerged was the teaching of ecology, considered a central perspective for understanding the dynamics of river systems. Subsequently, the discussion turned to environmental education, focusing on both human responsibility and human

wellbeing, as well as the riparian vegetation that such a context can provide. The aim was to describe the river as a complex ecosystem, taking into account both its natural aspects and its interactions with human activities. A secondary component that expanded on this concept centred on ecosystem services, which in turn encompass more specific themes such as water quality, hydraulic risk, small-scale hydroelectric power, biocenosis, flooding, and environmental monitoring and sampling. A second area focused on the students' final outcomes at the end of the course; these topics gave rise to ideas regarding the format of the final presentation, concluding remarks, and possible future outputs. The third area, meanwhile, was devoted to the innovative teaching methodologies and pedagogical approaches that were adopted. The key themes in this area were the student-teacher relationship and their respective perspectives, as well as teaching and learning strategies (QUORUM Team, UNITE!, 2025).

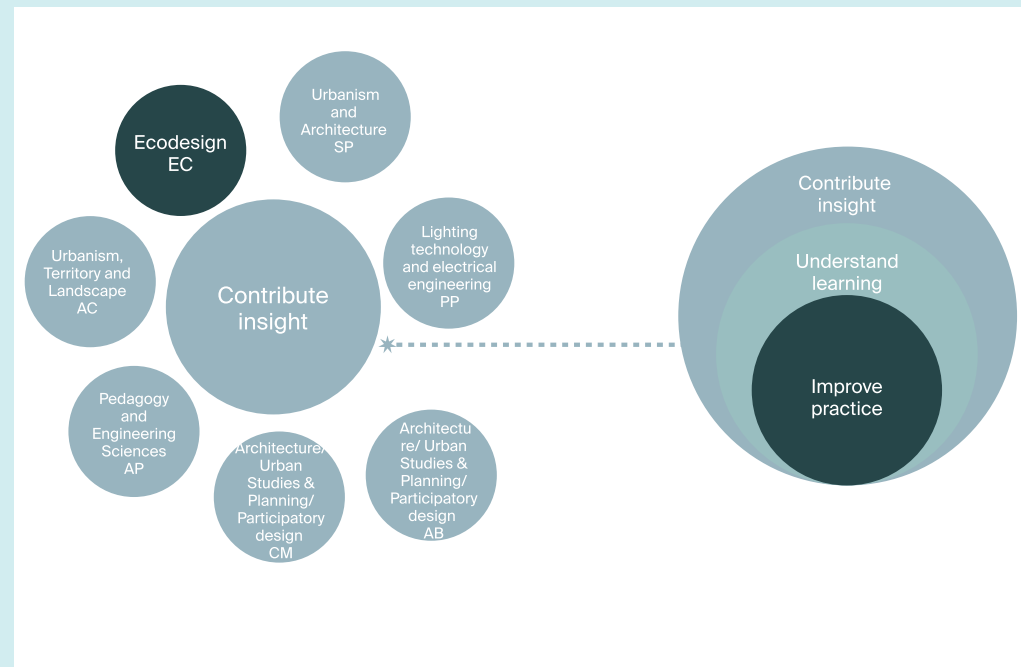


Figure 66. QUORUM Project, Ring model - Contribute Insight, Keywords Glossary in WP2: Co-design the Urban Rivers Module, 2025.

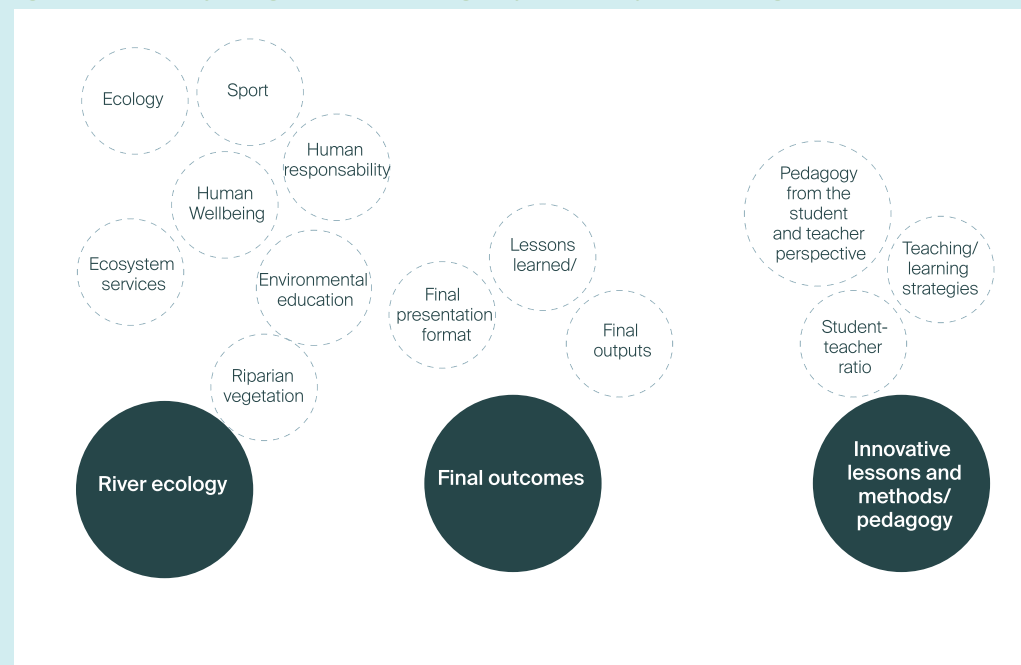


Figure 67. QUORUM Project, Ring model - Contribute Insight, Keywords Glossary in WP2: Co-design the Urban Rivers Module, 2025.

For the in-person component, the plan is to analyse the river environment first-hand. Operational stages have been devised to guide the observation and analysis of the site, structured according to the Learning Arches (LAs) method, developed by Simon Kavanagh, which views learning as a dynamic experience rather than a simple sequence of lessons. The model is based on the SKAV (Skills, Knowledge, Attitudes and Values) framework, which considers four fundamental dimensions of learning: skills, knowledge, attitudes and values. The first two represent the most tangible aspects, whilst attitudes and values constitute dimensions that are less visible but essential for the student.

Each Learning Arc is structured into three main phases:

Set, the initial phase, in which engagement, motivation and expectations are established, defining the context and objectives of the programme;

Hold, the central phase, in which the activities, experiences and challenges take place that enable students to learn through action; this is the phase of highest operational intensity (High Action)

Land, the concluding phase is dedicated to reflection, evaluation and the consolidation of learning; a phase of reduced activity (Low Action). This phase is particularly important as students consolidate what they have learnt, reflect on the experience, link new knowledge to real-life contexts and prepare for future learning pathways.

Throughout the process, mid-arch intervals are also incorporated to monitor progress and realign objectives and expectations.

The teacher acts as a facilitator of the learning experience, ensuring flexibility, active listening, inclusion and transparency.

The method is also underpinned by the principles of the 7Cs (**Connection, Conditions, Context, Content, Craft, Character, Confidence**), which promote student engagement, practical skills development, personal growth, and autonomy (Kavanagh, 2019).

The analysis of the river environment, therefore, comprised three phases: the Set-Start phase, in which the river is introduced as a living organism. To begin exploring and learning about the environment, the mission objectives, rules, and tools to be used are presented. The second phase – ‘Hold: Field and Classroom Experience’ – comprises the two central elements of the experience: the river excursion, during which ecological observations are made, and documentation is gathered; and the return to the classroom to create a collective photo gallery. The photos will highlight an ecological issue observed by the participants and propose a practical solution to address it. This phase also includes an assessment session. Finally, the third phase: Landing, involves the presentation of the groups’ work; the sharing of solutions and proposals for regeneration; and a guided reflection on what has been learnt and on the group work.

This analysis has been expanded to include the perspective of Systemic Design, exploring how this discipline can enhance understanding of and regeneration in urban ecosystems. In this context, eco-design serves as the lens through which to observe the local area, identifying its challenges, opportunities and interrelationships. The river is not viewed merely as a natural feature but as a complex system in which the environment, people and infrastructure interact. The starting point for the analysis is therefore to take a snapshot of the research context, identifying some key themes: the natural environment, the ecological and biological dimensions, society, technologies and governance systems. To visualise this analysis, systemic design suggests various tools to use, such as Gigamaps (integrated maps combining photos, data and stories), maps of the stakeholders involved, resource flows, and diagrams of causal and feedback loops. The central part of the analysis examines the interactions

between the river and the local area: the activities, flows, and connections that characterise the area. It is followed by a comparative section that presents case studies to assess strengths and weaknesses. This is followed by stakeholder involvement, which is fundamental to the research, as it enables interviews and the collection of perspectives from those who actually live in that place. The final part of the analysis highlights the challenges and opportunities of the current context, compares them with a future vision for the river, and assesses their impacts and outcomes. These stages followed the systemic design methodology developed by the Systemic Design Lab at the Polytechnic University of Turin, which consists of a set of methods and tools to support the design process. This methodology is flexible and can be applied and adapted to different contexts, such as value chains, territories, social systems, and political organisations (QUORUM Team, UNITE!, 2025).



Understanding learning

Returning to the ring model, the second ring emphasises an understanding of the processes through which people learn: how they acquire knowledge, how they process it, and which cognitive, emotional and social mechanisms are involved. This requires a balance between theory and empirical data, with particular attention to the specific educational context. In this case, the learning strategies described in Chapter 5 were proposed, laying the foundations for the development of the practical activities in the Confluences module.

Improving practice

The innermost ring represents the most concrete objective: research and theories must translate into tangible improvements in teaching, through concrete teaching methods, tools and strategies. In this case, teaching strategies have been proposed, drawn from WP1, and can be integrated into an innovative course suited to a multidisciplinary context. These include: Role-Playing Simulation (simulation through role-play) for disciplines related to pedagogy and urban studies; Case Studies (analysis of case studies); Gigamaps, Roadmaps and Comparison Matrix (tools for visualisation and systemic

comparison) specifically for eco-design and electronic engineering; Brainstorming / Idea Generation (collaborative generation of ideas); Overlapping Incisions, Singular Forms, Time and Urban Layout (activities involving the reading and interpretation of urban space), particularly for architecture and urban planning; Data Collection and Analysis in Groups; and Gallery Walk (collective presentation and discussion of results) (QUORUM, UNITE!, 2026, Appendix 3). Following individual contributions, an initial structure for the module was proposed, comprising 75 hours and corresponding to 3 credits.

The first phase, to be carried out online, includes an introduction to the course and self-directed learning throughout the semester, totalling 12 hours of online lessons. The online lessons are divided into: an initial (synchronous) session lasting 2 hours, covering teaching and learning strategies, the student-teacher relationship, pedagogical concepts and course objectives; and specific (asynchronous) lessons comprising 7 sessions, each lasting 1 hour and 30 minutes per lecturer. This is followed by a total of 18 hours of independent study, comprising preparatory materials and readings, as well as the activation of the collaborative platform (Miro, Teams, etc.).

The second phase of the module focuses on teamwork and collaborative projects and takes place over one week, totalling 13 hours. During this phase, international teams are formed to work on micro-projects based on real-life cases; case studies are analysed; and participants gain an in-depth understanding of the context surrounding the river at the lead university. This is followed by guided sessions and the creation of a simplified final product (a map, concept, or poster). The third phase involves an intensive one-week on-site session, totalling 32 hours. This comprises five days of on-site and classroom-based activities, including practical and group work, contributions on each subject, project presentations, peer review and a brief final assessment (QUORUM Team, UNITE!, 2025).

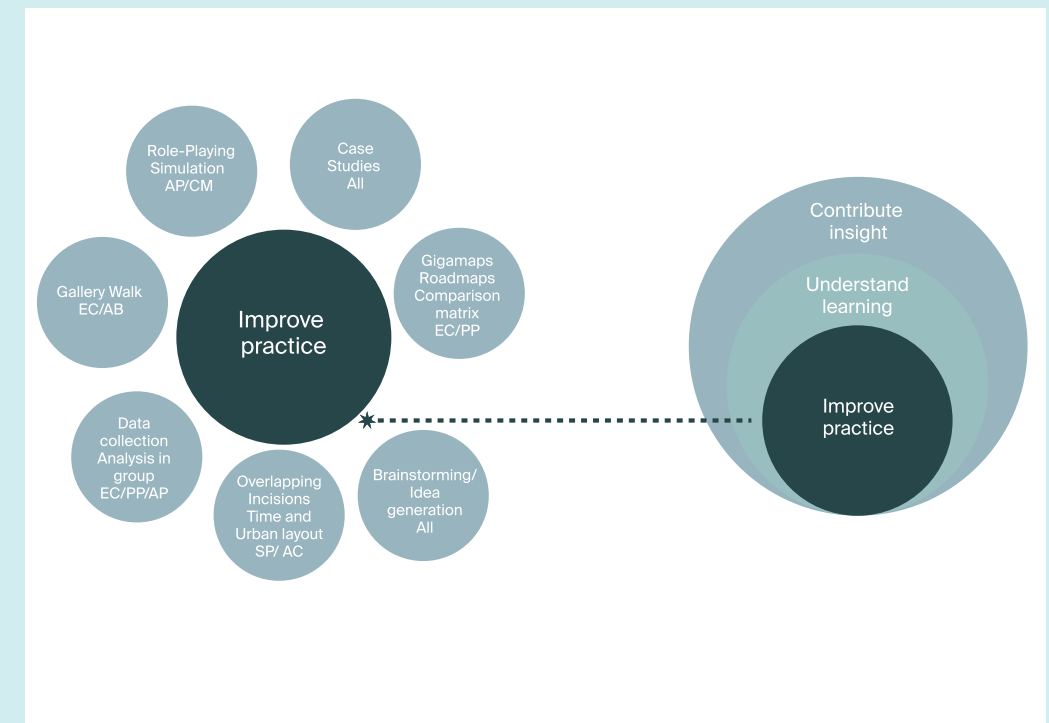


Figure 70. QUORUM Project, Ring model - Understanding Learning & Improving Practice, Keywords Glossary in WP2: Co-design the Urban Rivers Module, 2025.

Inter-institutional coordination for the development of the QUORUM module

8.2.4

During the project phase, the group analysed how the QUORUM module could be implemented at the respective partner universities and investigated the institutional requirements for launching a blended intensive programme (BIP). Due to the summer closure (August 2025) and the temporary absence of the relevant staff, none of the universities involved was able to obtain a formal response from the relevant departments. In light of this situation, following an initial sharing of the available information on each institution's BIP requirements, the discussion focused on the choice of host institution, the identification of a suitable timeframe for staff and student mobility, and funding procedures for student mobility grants. Through the discussion, Aalto University was identified as the first choice to host the QUORUM module. If the proposal had not been accepted by the university's administration, the choice would have fallen alternatively on either the Polytechnic University of Turin or the University of Barcelona. Aalto University, therefore, prepared a

statement of interest regarding the launch of a blended intensive programme (BIP) as part of the QUORUM project – Quest for Urban Obdurate Resilience in Uncertain Milieus. The document formalised the results of a collaborative phase between the partner universities, aimed at assessing the feasibility of the QUORUM module as a BIP and identifying the host institution for its first implementation, as well as the remaining partner universities. The declaration outlined the general framework of the course, its learning objectives, the teaching structure, and the organisation of the virtual and face-to-face components, to support the funding application and initiate the institutional procedures required by the Erasmus+ programme. Specifically, the details of the Blended Intensive Programme (BIP) were outlined: it is open to all levels of study (bachelor's, master's and doctoral degrees) and must provide a minimum of 3 ECTS credits. A BIP may be integrated into a study programme or offered separately as a stand-alone programme. It must offer added value com-

pared to the courses or training programmes already offered by the participating universities and may be offered over several years. However, a BIP with the same title and the same learning outcomes may be applied for and implemented only once per Erasmus+ funding period. The roles within the BIP partnership between the coordinating and sending institutions were clarified. The former organises the on-site placement and the virtual learning component; it must have an inter-institutional agreement with the sending institutions, sign the Learning Agreements and mobility agreements, issue the Transcript of Results, issue certificates of attendance, and handle the administrative aspects. Sending institutions liaise with the host institution, take account of the number of short-term mobility placements, sign the Learning Agreements/Mobility Agreements, add BIP participants to the Beneficiaries Form, handle the recognition of learning outcomes and manage the administrative aspects (QUORUM, UNITE!, 2026, Appendix 3).

8.2.5 Preliminary organisation of the module sessions 8.2.5

During the meeting with the participants, the following topics were discussed to begin defining the module's structure and content. The BIP has been confirmed by Aalto University. This initial version of the module included the following details: the title chosen for the module was initially 'Future Rivers: Interdisciplinary Visions for Water in Cities'; the virtual component will consist of seven sessions, to be held between April and June 2026 (3 hours each, plus 12 hours of independent study over four weeks). The virtual component will comprise interactive online seminars and working sessions, moderated by BIP lecturers from various disciplines. Participants will work synchronously in small groups and prepare individual assignments asynchronously for integration into subsequent online sessions.

The virtual component provides students with discipline-specific knowledge and methods for tackling urban water challenges, fostering interdisciplinary and multicultural co-creation of knowledge, and developing a common language. The face-to-face part will take place in Helsinki from 3 to 7 August 2026 (five days, 6 hours of teaching per day and approximately 3.5 hours of independent group work). Not all online sessions will necessarily be synchro-

nous; some may be asynchronous. Students will enrol on the BIP in January 2026, and upon completion of the course, Aalto University will issue certificates of study to participating students and certificates of attendance to BIP participants (3 ECTS credits, totalling 81 hours).

In terms of content, this module will address water-related challenges in the context of climate change and will focus on re-evaluating urban water resources (rivers, bays, lakes) as culturally embedded elements and providers of ecosystem services for a resilient urban future. Teaching methods will include co-creating knowledge through seminars and workshops, in which students work in interdisciplinary and multicultural teams to explore innovative approaches to urban rivers. These approaches will encourage the integration of perspectives, problem-based learning, and critical and reflective thinking. Participants' work will be assessed by the development of shared interdisciplinary skills and by their ability to collaborate to develop innovative approaches to urban water-related issues. The BIP's learning objectives will support students' collaborative and interdisciplinary activities as they tackle the management and transformation of urban rivers. As part of a student-cent-

tred approach, BIP lecturers will facilitate participants' joint learning, the co-creation of knowledge and the collaborative development of integrative approaches to addressing urban water issues with a view to a sustainable future.

The learning outcomes will be:

To co-create a shared interdisciplinary language to foster communication and understanding across different fields.

To critically reflect on the interactions between disciplinary roles within a complex urban system.

To facilitate inclusive collaboration through effective teamwork practices.

To jointly analyse challenges related to urban water from an interdisciplinary and systemic perspective.

To apply collaborative communication skills that enable constructive dialogue and joint working.

The course will be open to students at all levels of study (bachelor's, master's and doctoral) within the UNITE! universities. We expect 4–5 students from QUORUM's partner universities to participate, for a total of 18–20 participants. Participants from other UNITE!'s partner universities may also join. Selection will be based on the inclusion of participants from as wide a range of disciplinary backgrounds as possible across the UNITE! partner universities. Assessment will be ongoing throughout the workshops, including presentations and the final assessment of the group project. The language of instruction will be English (QUORUM, UNITE!, 2026, Appendix 6).

To begin structuring the module, it was necessary to include information on the start of the academic year and the enrolment periods for each partner university. The possible structure of the online sessions was also discussed: formats such as guided discussions, short presentations, expert round-tables, fishbowl discussions and other participatory methods were considered. The importance of taking into account the learning objectives set out in the BIP application and applying them consistently in both the online and face-to-face components was emphasised.

On a practical level, two objectives were pursued in parallel: preliminary work was carried out on the keywords set out in WP1, and an initial outline for the module's sessions was drawn up. Starting with the terms related to the team members indicated in WP1, the most significant keywords for each subject were selected to create synergies across the various disciplines. The aim was to begin exploring the meanings of the keywords, which span different disciplinary fields, to highlight the course's multidisciplinary nature. The outcome of this work will be incorporated into the module's online lectures, forming the theoretical component available to students.

For the field of eco-design, the following have been selected: human responsibility, including environmental education; analysis and monitoring, including water quality, biodiversity, and biocenosis; and ecosystem services, including hydraulic risk, small-scale hydroelectric power, urban hydrology, flooding, and sampling. As regards the disciplines of lighting technology and electrical engineering, the most significant terms were: pollution, adaptive/integrative, control, energy efficiency, perception and illuminance/luminance; relating to the behaviour of light in urban contexts.

For Urban Studies & Planning and participatory design, the following were selected: water, data, plan, participation/role, urban city, communication strategy, observation, and communication, with a view to striking a balance between the two disciplines. Pedagogy and engineering sciences focused their vision on co-design, systems concepts, the challenges to be addressed, and evaluation and design. Architecture and urban planning have proposed a more technical perspective on the context, focusing on the analysis of the riverfront in architectural terms, connectivity, accessibility, how time shapes the landscape, and, consequently, the concept of transition (QUORUM Team, UNITE!, 2025).

Starting with keywords, identifying the possible content for each lesson and how it would be distributed over time, and also searching for case studies in video format, a detailed course structure was developed. Specifically, the choices were guided by the ILOs, from defining the number and type of keywords to strategies for stimulating debate, to the decision between synchronous and asynchronous activities, taking into account the commitments of teachers and students, so as to make the course sustainable and coherent overall.

Course: Future Rivers: Interdisciplinary Visions for Water in Cities

BIP 3 ECTS (a total of 81 hours)

Period:

Online: April and June 2026 or August

Physical: August 3-7 2026

Online component

Lesson 0: Synchronous, Teachers: Christine Mady /All, Arnold Pears, Time: 2:00h

Title proposal: When Rivers Meet - Opening Lecture

Content: The introductory lecture will begin with a welcome to students from the lead university, which will present the context and general vision of the project. Particular attention will be paid to the pedagogical aspects and multidisciplinary dimension of the initiative. The lecture will also include a brief environmental focus on the nature reserve located in the city of Helsinki, which will serve as the reference context for subsequent activities.

Format: The two recordings will be edited into a single format, with the addition of any effects or technical interventions if necessary. Each teacher will have 1 hour for their presentation, so that the lesson can be divided into two parts.

Details:

C.M will record the welcome section, presenting the general context and the project. As coordinator of the lead university, where part of the course will take place, she will also offer an environmental focus dedicated to the local area and the nature reserve.

A.P will record a presentation focusing on the importance of the pedagogical and multidisciplinary aspects of the course, illustrating how students can approach the different subject areas and what skills and perspectives they can develop through this educational experience.

He will conclude her presentation by greeting the students and inviting them to participate in the next lesson, thus introducing the continuation of the course.

Graphic material:

-Graphic interventions on the edited video

Lesson 1 Part A: Asynchronous, Part B: Synchronous, Teachers: A.B+A.C, Time: 3:00h

Title proposal: From Human Responsibility to Infrastructure - Glossary 1

Content: This is the first of three lessons dedicated to teaching vocabulary through the use of keywords, with the aim of providing students with a common conceptual basis on the main topics of the course and highlighting the multidisciplinary dimension of teaching.

Each lesson will be divided into two parts:

“Unpacking the Keywords” and “Cross-Talking the Keywords” – Part A – Asynchronous

Teachers, organized in pairs from different disciplinary fields, will present and comment on their keywords.

Each teacher will explain their own keywords and those of their colleague, highlighting points of contact, differences, and intersections between disciplines.

This section will be recorded and made available to students before the synchronous meeting. At the end of part A, the teachers will propose a task or a small challenge to be carried out individually.

“Connecting the Keywords” - Part B - Synchronous

During the live session, teachers and students will discuss the results of the task, encouraging discussion and collective reflection on the concepts learned and the multidisciplinary perspectives that have emerged.

Part A “Unpackaging the Keywords”

Format: video structured in two 20-minute segments (one per teacher)

Details: Part A – “Unpacking the Keywords” Time: 45 min

Introduction by the moderator (3–5 min)

Introduce the two teachers and briefly explain the purpose of the activity and the structure of the lesson

Explain the logic behind the cards: each teacher has 3–4 keywords.

Explain to students that they will need to take notes and reflect on the connections between the two fields.

Presentation by Teacher 1 (20 min)

Show one card at a time (graphic and/or physical on screen).

Explain:

What the keyword means to him/her.

Where it comes from (etymology, use in the discipline).

Why it is relevant to the Future Rivers project.

A practical or visual example (photo, map, case study).

Lecturer 2’s presentation (20 min)

Same structure, with 3–4 keywords from the field of Urbanism, Territory, and Landscape.

Again: explanation, context, concrete or visual examples.

Graphic material:

-Graphic interventions on the edited video

-The moderator may appear on video or as a narrator to maintain consistency between the two recordings; keywords are shown graphically

Part A “Cross-Talking the Keywords”

Format: 45-minute structured video in which teachers are on video call

Details: Part A – “Cross-Talking the Keywords” Time: 45 min

Brief introduction by the moderator (5 min)

Explain the rule of “If I say..., you say...”.

Remind students to observe the connections between the two fields.

Game / Word exchange (35 min)

Each teacher says one of their keywords.

The other interprets it from the perspective of their own discipline.

They take turns: 5 minutes per keyword × 7 words = 35/40 minutes.

To make the game more engaging:

Use a visual timer

Display the words on animated cards on the screen.

Conclusion and assignment of the task (5 min)

Teachers summarize what they have discovered about each other.

They propose the “challenge” for the next part.

Graphic material:

-Graphic interventions on the edited video

-The moderator may appear on video or as a narrator to maintain consistency between the two recordings; keywords are shown graphically

Part B “Connecting the Keywords”

Format: live online with the two teachers and students

Details: Part B – “Connecting the Keywords” Time: 1:30h

1. Opening and contextualization (5 min)

Brief recap of Part A
Presentation of the session’s objective: to relate the concepts learned through the assigned task.

2. Presentation of results/assignment (30–40 min)

Students individually present their work or reflections.
Each student explains how they linked a word from ecology to one from urban planning or explains the two tasks separately.
Teachers listen and take notes to respond later.

3. Guided discussion with teachers (20 min)

The two teachers comment on the presentations, highlighting:
convergences and divergences between disciplines;
new questions that have emerged;
real-life examples
Conclusion (5 min)
Announcement of the next lesson in the module
Thanks and final farewell.

Graphic material:

- Graphic interventions on the edited video
- The moderator may appear on video or as a narrator to maintain consistency between the two recordings
- Each student can project their work or show it on camera
- Alternate short “micro-surveys” (Mentimeter or Zoom chat) on which keyword students consider most “hybrid” or meaningful.

Same format and detail (change only teachers and title) for lesson 2 and 3

Lesson 2: Part A: Asynchronous, Part B: Synchronous, Teachers: A.B+A.P, Time: 3:00h

Titles proposal: “Collaborative Systems” - Glossary 2
“Co-design the urban system” - Glossary 2

-Lesson 3: Part A: Asynchronous, Part B: Synchronous, Teachers: P.P+S.P, Time: 3:00h

Titles proposal: “Illuminating the Landscape” - Glossary 3
“Margins of Light” - Glossary 3

Lesson 4: Synchronous, Teachers: A.P Time: 2:00h

Titles proposal: “From Content to Visual” - Methods and techniques of presentation
“Visual storytelling” -Methods and techniques of presentation

Content: The lesson presents a pedagogical reflection on the practices of presenting final results, analyzing which communication methods best promote learning and project sharing.

For example, the differences between an interactive visual presentation such as a gallery walk and a traditional A3 technical drawing board will be discussed, highlighting the advantages, limitations, and purposes of each approach. The first lecturer provides a general framework, presenting and comparing the different presentation models and strategies that will be explored in more detail in the following videos.

In the second part of the lesson, through short video contributions from the teachers, each professor will illustrate, in relation to their own discipline, the most effective presentation methods for communicating results.

Format: The recordings will be edited into a single format, with the addition of any effects or technical interventions if necessary. The first lecturer will introduce the lesson, which will last approximately 1 hour.

This will be followed by short contributions of about 10 minutes each from the other six professors.

Details:

Introduction (5 min) A.P

Initial greeting and presentation of the lesson objectives.
Short icbreaker: ask participants “what is the most memorable presentation you have seen and why?”

Key concepts (40 min)

Presentation of the pedagogical principles of effective presentation.
Explanation of possible presentation methods

Example related to the discipline: viewing of 7 presentation examples by teachers of each subject (70 min- 10 min each)

Highlight why they work
Major uses
Results obtained

Closing (5 min) A.P

Final farewell to students and assignment of a mini task aimed at consolidating what has been learned:
students will have to use one of the presentation methods discussed in class to introduce themselves, “how would you introduce yourself?” by creating a project of their choice that will be discussed during the week in class to break the ice during presentations.

In person: “Assigning the Challenge”
Introduction to the task (10 min)
 Teachers explain that the objective will be to recount the educational experience gained in the Future Rivers project in a reflective and creative way.
 Students will already be divided into interdisciplinary groups
Assignment delivery (20 min)
 Each group must prepare a collective presentation (max 10 minutes) to recount their experience.
 The presentation should answer questions such as:
 What advantages did you perceive in multidisciplinary?
 What did you learn from comparing different approaches and languages?
 Were there any difficulties or fears that you overcame during this experience?
 How has this experience changed your view of the theme “Future Rivers”?
 The group is free to choose the format: (video, visual presentation, digital collage, short performance)

Online: “The Human Side of Future Rivers”
Opening by the moderator (5 min)
 Introduce the purpose of the session
Presentation of the groups (75min)
 Each group presents its work (15 minutes x 5 groups).
 The others listen and can leave brief comments or keywords in the chat.
Final discussion (20 min)
 Teachers reflect on the themes that emerged
 Closing: each group chooses a word or phrase that sums up what they take away from Future Rivers. Use a collaborative whiteboard (Miro) to write down the final words live.
 At the end, generate a ‘keyword map’ as a visual symbol of the experience.
 Final greetings and invitation to listen to the final lesson

Prepare a Miro whiteboard to share, collecting some of the words that emerge to be updated at the end of the presentations with everyone

-Lesson 6 Asynchronous, Teachers: C.M + All, Time: 30m

Title proposal: “Closing the Flow”

“When Rivers Return” – Closing Lecture

Content: The final lesson of the BIP Future Rivers aims to conclude the training course with a collective reflection, retracing the evolution of the project from the first meeting to the in-person experience. It will also be an opportunity to present future editions of the BIP and encourage students to participate.

Format: The lesson will be edited into a single format with recordings from each professor for a total duration of 30 minutes, with the addition of any effects or technical interventions.

Introduction – “Looking Back” (10 min)

C.M (coordinator of the lead university) opens the lesson:
 thanks students, teachers, and partners;
 briefly reviews the evolution of the BIP, from the initial idea to the activities carried out;
 recalls the main stages: online lessons, week in attendance, group work, collective reflections.

Micro-contributions from teachers – “Our Reflections” (10 min- 1 min each)

Series of short clips recorded by each teacher.

Graphic material:

Graphic interventions on the edited video

Visual closing + credits with the names of all participants and partners.

During the presentation of the module's structure to the partners, a discussion took place which led to the collection of a series of suggestions and operational guidelines to be incorporated into the design of the BIP. The contributions covered both conceptual and methodological aspects. The main points that emerged are listed below:

It was decided to define the scope of the case study to be analysed in Helsinki to amend the module title. The title chosen was “Confluences: Interdisciplinary Visions for Water in Cities” to highlight the relationships among the subjects from an interdisciplinary perspective and to focus on a common theme.

Given that one of the BIP's objectives is to prepare a glossary to share diverse knowledge, “lesson” has been replaced with “session”

Regarding the introduction, everyone agreed on the overview to be provided by the lead university and on the pedagogical aspects.

Regarding synchronous and asynchronous delivery, the proposal was to hold the sessions synchronously and record them.

The idea of organising a debate between two lecturers was approved, as was the selection of the key terms to be explored.

It was proposed to organise six online sessions before the Aalto session and just one afterwards, changing lesson 0 to session 1 so as to have seven sessions.

The tasks for the online sessions and face-to-face activities have been defined.

The idea of an online session on ‘Presentation Methods and Techniques’ has been approved.

A matrix has been proposed to align learning objectives with methods, content, activities and assessment, which is important for the design of the BIP; this links learning objectives to sessions, content, methods, activities and assessments, ensuring that all slides have objectives and sub-objectives

Plans were outlined to clarify the credit registration process.

It was confirmed that the 81 hours of the BIP would be included in the sessionalons.

Consideration was given to whether students would speak individually or in pairs.

It was recommended that the Zoom platform be used.

Based on the feedback received during the meeting, the overall structure of the module was made more fluid and consistent, and a summary Excel file was prepared. The main changes made were as follows: the elimination of the moderator role, which proved too complex to manage; the transformation of most lessons into synchronous sessions, with recording still provided; and the revision of some titles to make them clearer and more specific. (QUORUM Team, 2025)

Logistical organisation of the module at the lead university and the host universities

8.2.6

The logistical organisation of the BIP at **Aalto University**, as the lead university, began with a series of preliminary email exchanges and face-to-face meetings. In particular, the Department of Architecture was involved in defining the procedures required to include the course as an optional module, whilst the Arts International Office was contacted to prepare the Memorandum of Understanding (MoU). At the same time, coordination began to manage incoming students participating in the BIP. The other partner universities were asked to liaise with their respective International Offices to organise Erasmus mobility for staff and students. It was agreed that the availability of the course as an optional subject at Aalto University would be clarified by December 2025. The official announcement of the BIP and the subsequent selection of participants are scheduled for January 2026. The partner universities will also need to plan accommodation arrangements in advance for outgoing students travelling to Finland, identify suitable accommodation, and arrange accommodation for teaching staff.

The **online component** of the BIP has been scheduled for April 2026. In May 2026, the classrooms and spaces required for the face-to-face

part, scheduled for August 2026, were booked. A concluding online session is also planned for between September and October 2026, followed by the final reporting and documentation phase of the BIP. Monday has been designated as the day set aside for online sessions. Individual pairs of lecturers have independently agreed on specific dates, identifying those compatible with both parties' commitments. Lesson 6, based on students' reflections on their experience at Aalto University, was scheduled to take place after the face-to-face component; consequently, it has been moved to the final stage of the timetable, as indicated in the preliminary planning document. Lesson 7 will be devoted to discussing the future developments of the BIP and may be delivered by the designated lecturer, in line with the established timetable.

The final title of the course has been agreed as **"Confluences: Interdisciplinary visions for water in cities"**, and the case study to be analysed in person will be **Töölönlahti Bay**. With regard to the Intended Learning Outcomes (ILOs) and the abstract, it was deemed appropriate to refer to those already developed for the BIP proposal submitted to Aalto University. It was also decided to adopt **Central European Summer Time**

(CEST) for the online sessions. The total number of BIP hours has been divided into online hours, face-to-face hours and hours of individual work.

The **main teaching activities** of the course have been defined, comprising: a pedagogical and interdisciplinary analysis; exploration of the environmental context; the development of a shared methodological framework; the establishment of a common language through glossaries and keywords; an in-depth study of presentation methods and techniques; field visits to the study area; face-to-face teaching activities; opportunities for collective reflection, discussion on the future development of the BIP, and the dissemination of results within the UNITE! community.

The **assessment methods** included group activities, assignments to be completed between online lessons, and a final presentation.

Regarding the **selection criteria**, eligibility requirements, and application procedures, it was decided to set up a dedicated email address for the course that all partners would share. Through this channel, students submitted their letters of motivation, which described their backgrounds and the contributions they in-

tended to make to the course, enabling all the lecturers involved to assess their submissions. In accordance with the scheduled timetable and credits, and the guidelines set out in the call for applications, the online and face-to-face activities were rescheduled. The online lessons were streamlined and reduced to four sessions, prioritising an active, student-centred approach. The face-to-face activities were designed to be consistent with the online ones, with the aim of bridging the two components of the course (QUORUM, UNITE!, 2026, Appendix 5).

Online Session-Flow Map

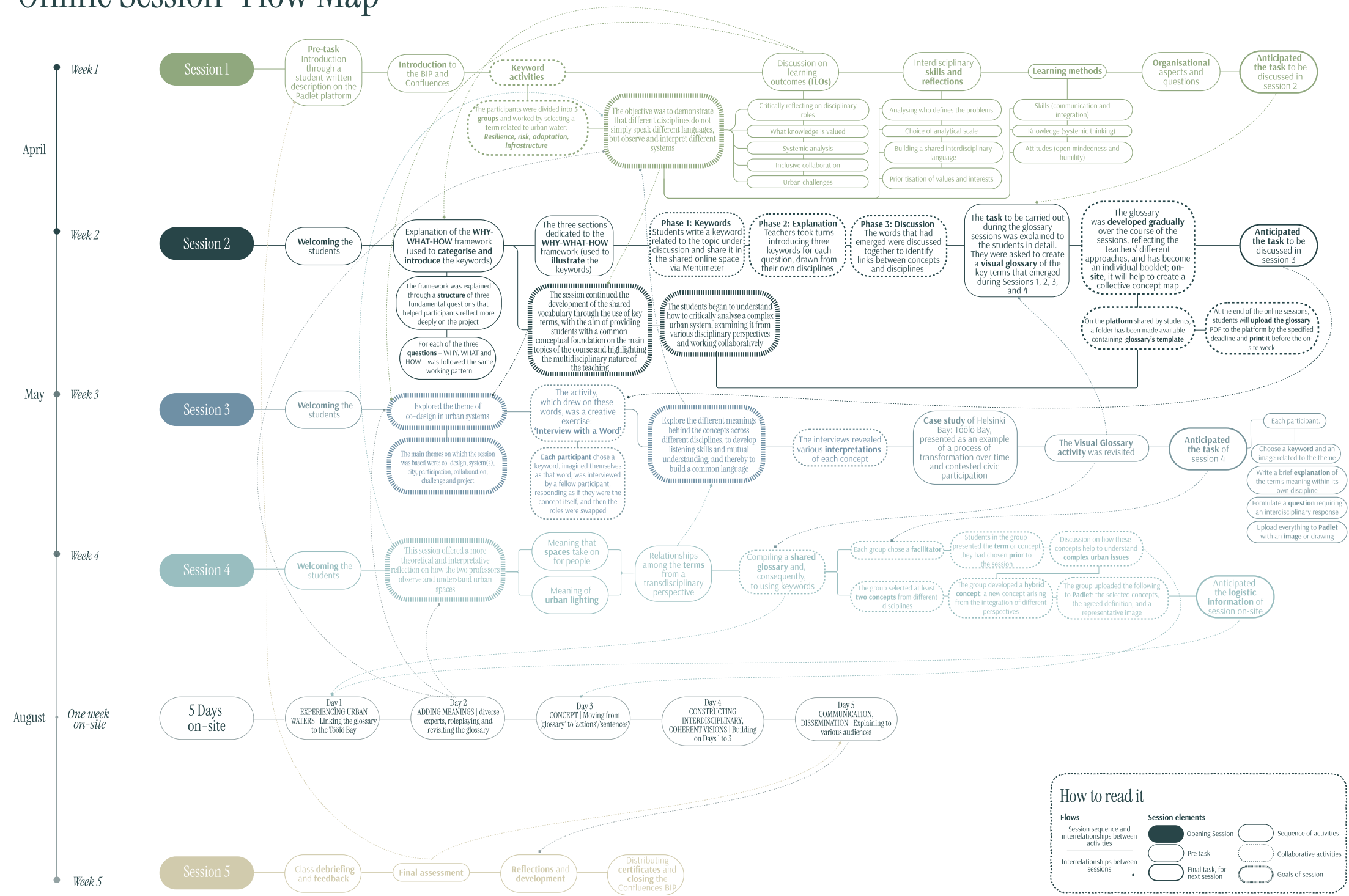


Figure 71. QUORUM Project, Online Structure in WP2: Co-design the Urban Rivers Module, 2025.

Publication of the application form

8.2.7

The email address dedicated to the BIP, confluences@aalto.fi, has been set up and is now operational. The BIP has been officially announced on the Aalto University website and included in the UNITE! course catalogue. In December 2025, a meeting was held with a colleague from Aalto University who had previously coordinated several BIPs. During the meeting, useful suggestions based on experience were shared, including some contacts for a potential tour guide. The provision of this support will be assessed based on the final number of enrolled students and the available budget. A further meeting has been scheduled for January with two colleagues from the Department of Hydraulic Engineering at Aalto University to assess the possibility of their participation or presentation during the on-site component of the BIP, scheduled for August 2026 (QUORUM, UNITE!, 2026, Appendix 5).

On the part of the Polytechnic University of Turin, a meeting was held with the International Mobility Office to discuss the timetable, the procedures for announcing the BIP, the entry requirements and the selection process – which will be based on a ranking list – as well as the decision to open applications to students from the following faculties:

Bachelor's degree in Electronic Engineering, Electronic and Communications Engineering, Environmental and Land Engineering, Design and Communication, Communications Engineering; Master's degree in ICT Engineering for Smart Societies, Electronic Engineering, Environmental and Land Engineering, Georesources and Geoenergy Engineering, and Systems Design.

Four places have been opened, meaning four scholarships are available for students (two places for Master's programmes and two for Bachelor's programmes) (Politecnico di Torino, 2025).

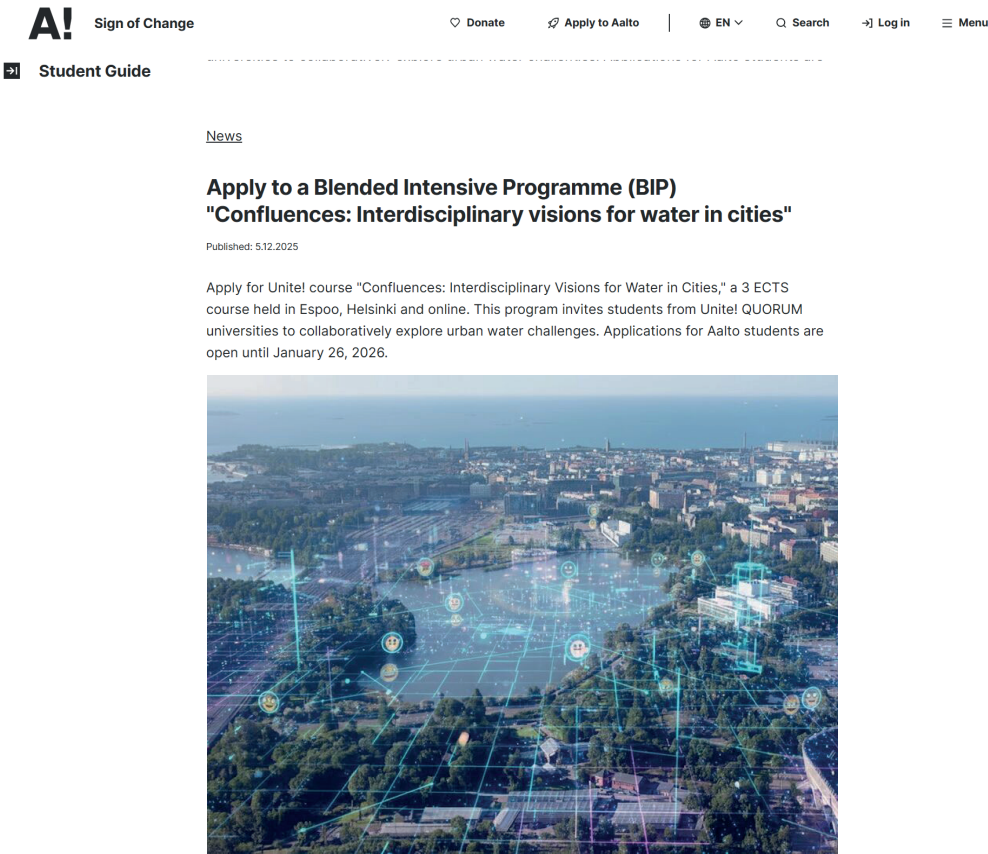


Figure 72. QUORUM Project, Publication of the application form. (Aalto University, 2025).

The module: Confluences: Interdisciplinary visions for water in cities

8.3

The application included a description of the course, setting out the programme and its objective: “an opportunity to explore the multifaceted role of urban waters – rivers, lakes, bays and wetlands – in the context of climate change. Viewed both as cultural spaces and as ecological resources, these waters are fundamental to building a resilient and sustainable urban future.”

The Expected Learning Outcomes and the programme were set out as follows:

“Online sessions – via Zoom. The first session will take place on Monday, 20 April 2026, at 10:00 CEST / 11:00 EEST (duration: 2 hours). Sessions 2 to 4 will take place on 27 April, 4 May and 11 May 2026. The final online session will be dedicated to course reflection and feedback and will take place after the workshop at Aalto University on 12 August 2026 (duration: 2 hours). Face-to-face workshop – at Aalto University, Espoo and Helsinki, from Monday 3 to Friday 7 August 2026 (6 hours of teaching per day).

Workload: “This 3 ECTS course involves the following indicative distribution of workload: Lectures: 10 hours online (5 sessions of 2 hours each) and 30 hours of workshops (5 sessions of 6 hours each). Independent study: 15 hours (5 sessions of 3 hours each) alongside online lectures and 20 hours (5 sessions of 4 hours each) during the workshop. Independent reflection: 6 hours.”

Assessment and analysis: “Students are assessed on a continuous basis based on the collaborative process undertaken during the workshops, which includes presentations and a final assessment of the group project, reflections and final feedback on the course. To pass the course, students must attend and participate in all face-to-face teaching sessions and complete the assigned tasks, including the final reflection. The assessment will result in either a pass or a fail. And for students who require a mark from their own university, this will be assessed on a case-by-case basis.”

Eligibility criteria: “Open to all levels of study (BA/MA/PhD) at the UNITE! QUORUM universities: Aalto University – Finland, PoliTo – Italy, UPC – Spain, FAULisboa – Portugal and KTH – Sweden. Students interested in attending this course must enrol for the spring 2026 and autumn 2026 semesters. At Aalto University, priority is given to students of Urban Studies and Planning (USP), students of the Faculty of Arts, Design and Architecture, students of the Faculty of Electrical Engineering, and all other interested Aalto students.”

How to apply: “A brief CV (1 A4 page) including academic qualifications, English language proficiency and contact details. A transcript of the contents of your cover letter (500 words, 1 A4 page) setting out your reasons for applying for this course, your intended learning objectives, how the course fits in with your educational goals, your interest in interdisciplinary studies, and your commitment to attending all sessions of the BIP course. Please send both documents as PDFs to confluences@aalto.fi, stating your specialisation and year of study. The deadline for submitting your application is 26 January 2026. You will be notified of the decision on your application by 30 January 2026. The deadline for submitting applications for admission to KTH has been extended to 16 February 2026. KTH applicants will be notified of the outcome of their application by 20 February 2026.

The selection process: Selection is based on the motivation letter, proficiency in English, previous experience (teamwork, communication skills, previous interdisciplinary and international experience), willingness to collaborate with people from different backgrounds, a desire to explore new ways of learning, and a commitment to actively participating in all course sessions. Our aim is to include motivated participants from a wide range of disciplines across UNITE! QUORUM's partner universities.”

In addition, any student wishing to apply was required to contact their university's international office for more detailed information on the application and selection procedures (Aalto University, 2025)

Coordination and organisation of the module's virtual sessions

Following the publication of the application form, each university selected its own students in accordance with the procedures set by its international mobility office. On the part of the Polytechnic University of Turin, the selection was carried out in accordance with the ranking list, with a focus on interdisciplinarity. A total of 25 students were therefore selected, predominantly from the fields of architecture, urban planning and engineering, as well as a group of doctoral-level students.

Aalto University was represented by four students: two enrolled on the USP Master's Programme and two in the PhD in Architecture.

Politecnico di Torino (PoliTo) participated with three students, two of whom were Master's students in Environmental Engineering and one in Electronics Engineering, highlighting a predominance of environmental engineering.

UPC (Universitat Politècnica de Catalunya) had 8 students: most were from the Master's in Urbanism (4 architecture students), followed by students on the 4th-year Architecture degree programme (2 students), whilst the remainder were enrolled on the Master's in Urbanism with a specialisation in Landscape (1 student) and the Master's in Contemporary Project (1 student).

FAU Lisbon (FAULisboa) contributed 6 students, all from the Architecture programme, forming a completely homogeneous group.

The KTH Royal Institute of Technology was represented by 3 students, with different but complementary backgrounds: one in Real Estate and Construction Management, one in Energy and Environmental Engineering and one in Urban Planning and Design.

8.3.1

The first steps taken by the team to organise the online sessions were to create a single Zoom link to be used for each session; and to produce an information and welcome pack for the course, which was needed to draw up the programme and distribute it to each participant; each pair of lecturers responsible for a session will prepare the necessary materials and check how the ILOs will be addressed; standardising the opening and closing presentations for the sessions, ensuring they are coordinated and that the content and activities comple-

ment one another; and creating a shared space for materials that participants can access. Specifically, during the online sessions, each lecturer may use a tool of their choice to make the session more interactive (e.g., Miro, Padlet/Mentimeter). Padlet will also be used by students prior to Session 1 to get to know the team. Furthermore, to simplify communication, each lecturer will create a dedicated WhatsApp group for their students. Session 5 will be dedicated to debriefing and final feedback (QUORUM, UNITE!, 2026, Appendix 5).

In the Confluences email dated **20 March**, students received the module information pack. This included: an introduction to the course on offer and its ILOs; details of those involved in the programme, divided into lecturers and students, with the latter being invited to share their learning journey, motivations and expectations via the Padlet platform.

The timeline for the module's scheduled sessions was shared, with times given in Helsinki summer time, and it was specified that the time allocated for independent study and individual reflection is an approximate estimate.

The online sessions will take place on **20 April** from 11.00 to 13.00; on **27 April, 4 May**, and **11 May** from 16.00 to 18.00; and on 10 August from 11.00 to 13.00. For the face-to-face sessions, **Day 1**, on 3 August, will be dedicated to the excursion and will begin at the Oodi Library. **Days 2 to 5**, from 4 to 7 August, will take place at Aalto University. The package also sets out the teaching methods to be used on the course: problem-based learning, co-production, co-creation, self-motivation, commitment, active participation, collaborative imagination, peer learning, reflexivity and ESD competences; and the topics to be covered:

Building a shared lexicon: Co-creating vocabulary related to urban waters. Navigating epistemologies across disciplines, managing contestations and maintaining the motivation to employ curiosity towards co-creation.

Communicating across audiences: Use writing and storytelling, visualisation and mapping to bridge across disciplinary vocabularies. Translating across disciplines and cultures and establishing linkages.

Interdisciplinary competences: Recognising interactions at various scales; imagining alternative futures based on critical readings of the current state; networking within a safe learning environment, which encourages experimentation, empathy, and reflexivity.

The expectations have been clearly set out: assessment will focus on the student's contributions to the collaborative process, including the development of shared interdisciplinary skills, your reflective practices, and the progress made by your interdisciplinary team in creating transformative approaches to issues relating to urban water resources. To pass the course, you must attend and participate in all teaching sessions (both online and in person) and complete the course assignments, including the final reflection. Assessment will be on a 'Pass' or 'Fail' basis; however, students who require a mark from their home university will be assessed on a case-by-case basis.

The platforms to be used will be: Zoom for online sessions, with a password shared to access them; UNITE! Metacampus, where materials will be shared via an access link, and other online platforms. The email address confluences@aalto.fi will serve as the official communication channel for the entire duration of the BIP. Online tools (such as Padlet or Miro) will be used for teaching activities, and the on-site sessions will begin with a visit to the study area. At the end of

the information pack, practical details regarding arrival in Finland were provided. Specifically, these covered the layout of the Helsinki metropolitan area, the location of the university and the relevant department where the course will take place: the Confluences BIP is hosted by the Department of Architecture, in collaboration with the Department of Design and the Department of Electrical Engineering. The on-site sessions in August will be held at the Väre building. Further information covered transport options and ticket purchases for travelling to Helsinki Central Station or Aalto University from the airport, or upon arrival by ferry. The final tips covered recommended accommodations, payments, and the main supermarkets open 24 hours a day. Finally, contact details for Aalto's Erasmus offices were provided, along with the course's official email address (QUORUM Team, UNITE!, 2026).

Aalto University April - August 2026

Confluences

Interdisciplinary visions for water in cities

Welcome!

Aalto-yliopisto
Aalto-universitetet
Aalto University



Politecnico
di Torino



UPC

UNIVERSITAT POLITÈCNICA
DE CATALUNYA
BARCELONATECH

U LISBOA

UNIVERSIDADE
DE LISBOA



KTH
KTHNORRA
TEKNIKA

Figure 73. CONFLUENCES_INFO-PACK. (QUORUM Team, 2026)

Confluences

Timeline

▶ April and May online sessions - 4 DAYS

▶ August on-site sessions - 5 DAYS

▶ August closing online session - 1 DAY

Session times are indicated in Helsinki summertime, EEST. Remember to check which time zone you are in!

Time zones	Helsinki summertime EEST	Barcelona, Torino, Stockholm summertime CEST	Lisbon summertime GMST
	11.00-13.00	10.00-12.00	9.00-11.00



Figure 74. CONFLUENCES_INFO-PACK. (QUORUM Team, 2026)

Organisation and outcomes of the module's virtual sessions

8.3.2

Whilst working in pairs to structure the relevant online session, the team also met periodically in plenary sessions to discuss the organisation and coordinate between sessions. Content and student tasks were shared, suggestions were implemented, and, at the conclusion of each session, outcomes were reported.

The session: “Confluences: Interdisciplinary Visions for Water in Cities” – Session 1 (Opening Session) was led by lecturers Christine Mady and Arnold Pears, from Aalto University and KTH, respectively.

The introductory session was organised into six parts:

Introduction to the BIP and Confluences.
Keyword activities
Discussion on learning outcomes (ILOs)
Interdisciplinary skills and reflections
Learning methods.
Organisational aspects and questions

The session began by explaining what a Blended Intensive Programme (BIP) is, its core concept, and what makes it different. The participants were divided into groups and worked on selecting a term related to urban water (e.g. resilience, risk, adaptation, infrastructure) and discussed how it is defined across different disciplines; which aspects it highlights or overlooks; and which assumptions are implicit in its use. The aim was to show that different disciplines do not simply speak different languages, but observe and interpret different systems.

A first group worked on the following terms: Resilience, Risk, Infrastructure, Human-Nature.

Their reflections brought to light various concepts.

Flood risk (urban planning): flood risk and transition spaces or flood-prone areas.
Adaptation (architecture): adapting cities to climate change.
Decentralisation (urban planning): the distribution of urban functions.
Social aspects: equity, access to resources, wealth as a resilience factor, and climate-induced migration.
Sense of place (Urban Planning, Architecture): the identity of places and access to natural resources.
Rainwater harvesting: the collection of rainwater, linked to nature-based solutions.

268

A number of critical questions also emerged:

project implementation timelines;
The evolution of solutions in the face of climate change;
governance and decision-making processes.

A second group focused on the theme of Infrastructure, understood as a theme that enables:

the development of waterfronts;
The growth of adaptable systems for climate resilience;
wastewater treatment;
urban mobility flows;
the enhancement of the human experience;
urban metabolism;
connectivity and network optimisation;
the development of ecological and water infrastructure;

Two groups expanded on the concepts of resilience, risk, infrastructure and the relationship between humans and nature.

The definitions included:

the ability to tackle urban water-related challenges, such as flooding;
urban resilience as cities' adaptation to environmental challenges, and the ability to recover after a shock;
the ability to withstand stress without losing functionality;
nature-based solutions (e.g. green roofs);
The ability to adapt to change; the relationship between adaptation and decision-making.
desalination as a technology for converting salt water into drinking water.
Risk is understood as the probability that an event will occur.
human-nature as the ideas and perceptions that people develop regarding water bodies and nature.

The entire discussion in the fourth group centred on the concept of risk, understood as

related to infrastructure (delays, costs, damage);
natural hazards such as earthquakes, landslides, fires, droughts and floods;
the interaction between a hazard (flood, earthquake, etc.) and a vulnerability;
associated with the improper use of urban spaces;
health, economic, safety and social risks;

269

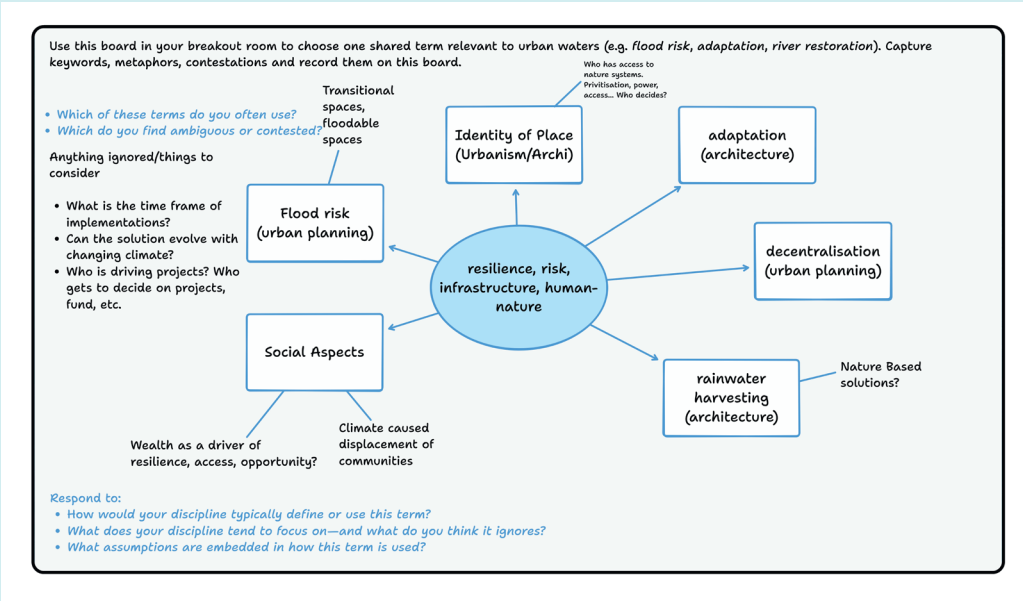


Figure 75. Confluences: Interdisciplinary Visions for Water in Cities. Session 1 – Opening Session. (Mady & Pears, 2026)

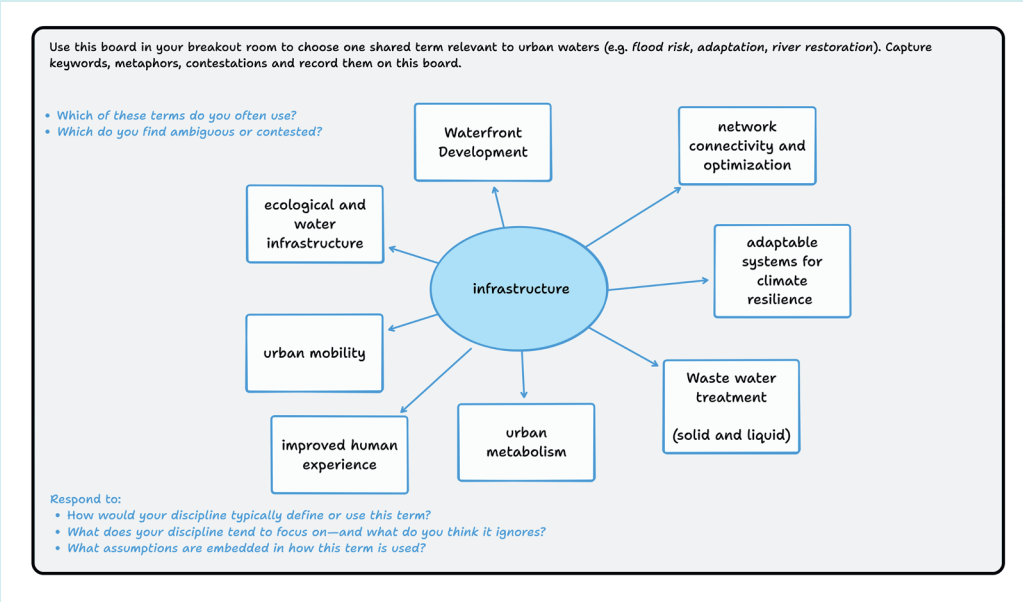


Figure 76. Confluences: Interdisciplinary Visions for Water in Cities. Session 1 – Opening Session. (Mady & Pears, 2026)

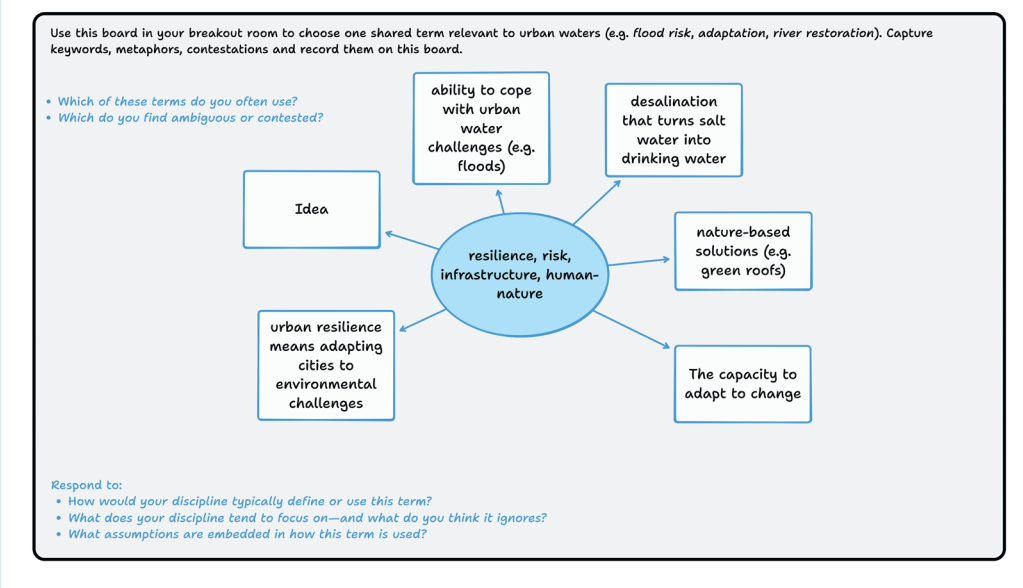


Figure 77. Confluences: Interdisciplinary Visions for Water in Cities. Session 1 – Opening Session. (Mady & Pears, 2026)

In terms of the key learning objectives (ILOs), the session focused primarily on: critically reflecting on disciplinary roles; analysing who defines the problems, what knowledge is valued, and what risks being marginalised; and building a shared interdisciplinary language that fosters mutual understanding without erasing differences.

Other objectives included inclusive collaboration, the systemic analysis of urban challenges, and collaborative communication skills.

Given that urban water systems were presented as socio-ecological-technical systems, the subsequent discussion centred on: problem definition; the choice of analytical scale; the

prioritisation of values and interests; and the importance of interdisciplinary dialogue. Continuing the discussion focused on pedagogy, the learning methods explained were based on: real problems related to urban water; acceptance of uncertainty (there are no single answers); dialogue between different perspectives; and reflection as a learning method.

Three dimensions were emphasised: skills (communication and integration); attitudes (open-mindedness and humility); and knowledge (systemic thinking). The final part of the lesson outlined the course organisation and future online sessions and anticipated the task to be discussed in session 2 (Mady & Pears, 2026).

The second session: “From Human Responsibility to Infrastructure” – Session 2 | Glossary 1

was led by the lecturers Elena Comino and Álvaro Clua, from the Polytechnic University of Turin and the Universitat Politècnica de Catalunya, respectively.

The session continued teaching vocabulary using key terms, aiming to provide students with a common conceptual foundation for the course's main topics and to highlight the course's multidisciplinary nature.

Building on this foundation, the students began to understand how to critically analyse a complex urban system, examining it from various disciplinary perspectives and working collaboratively. This session featured presentations by Professor Elena Comino and Professor Álvaro Clua. The two speakers addressed, respectively, topics related to environmental engineering, eco-design, ecology, and urban planning and architectural aspects linked to water in the urban environment.

In this section of the chapter, we will examine, in particular, the concepts related to the first presentation, as they are most consistent with the research approach and objectives.

The session consisted of four stages:

Welcoming the students

An explanation of the WHY-WHAT-HOW framework (used to categorise and introduce the keywords)

The three sections dedicated to the WHY-WHAT-HOW framework (used to illustrate the keywords)

The final task for the students and the closing remarks

The WHY-WHAT-HOW framework was explained through a structure of three fundamental questions that helped participants reflect more deeply on the project.

Why: concerns the motivations and ethics of the project. Why are we observing a phenomenon? Why is it important to take action?

What: concerns the subject of the project, that is, what we are observing or analysing.

How concerns the methods, that is, the tools and approaches we use to study and design.

During the lesson, we covered these three stages, one for each dimension.

For each of the three questions – WHY, WHAT and HOW – we followed the same working pattern.

Phase 1: Keywords

Students were asked to write down a keyword related to the topic under discussion and share it in the shared online space via Mentimeter.

It was made clear that this did not necessarily need to be a complex definition, but could simply be a concept important to them.

Phase 2: Explanation

Next, the teachers took turns introducing three keywords for each question, drawn from their own disciplines.

Each keyword was explained very briefly, with a few images or examples.

Phase 3: Discussion

Finally, the words that had emerged were discussed together to identify links between concepts and disciplines.

This discussion was important because the most interesting concepts often arise precisely from the meeting of different perspectives. The discussion took place entirely via the shared Mentimeter platform.

In explaining the third phase of the lesson, the initial project question was expanded:

Why – why do we observe and study these phenomena? – Design ethics

It was emphasised that design is not limited to solving a technical problem, but involves choices that have concrete effects on the environment, society and future prospects. For this reason, it is essential to examine the motivations and responsibilities that guide every design decision. Following this interpretative framework, the session continued by introducing three key terms, each associated with a different presentation. In particular, in Professor Comino's first presentation, the discussion began with the concept of environmental ethics, which was established as a fundamental reference point for guiding design thinking. It has been argued that environmental ethics concerns how human beings relate to nature, and so the question naturally arose: why should we protect it? This is because nature possesses intrinsic value, treats water as a common good, and raises concerns about our responsibility towards future generations. To support this assertion, the concept of ecological value was also introduced; the term ‘ecology’ was coined by Ernst Haeckel (1834–1919) to denote that ecology studies the relationships between living beings and the environment, ranging from individual organisms to the biosphere. Continuing the discussion on this topic, the second key term was ‘Human Responsibility’. Reference was made to the observations made in 1962 by the biologist Rachel Carson, who published *Silent Spring**, denouncing the effects of pesticides on biodiversity and human health. Reference was also made to the global initiatives that began in

the 1970s and the ideas of James Lovelock, Lynn Margulis, Fritjof Capra, Gunter Pauli and Donald Norman. Fast forward to the present day, and humanity now has the opportunity to make decisions that can profoundly alter the environment, thanks in part to technological innovations. This is why a third key concept was introduced, one that enshrines a necessary responsibility towards nature: **environmental legislation**. It not only protects the environment as a resource but also safeguards the balance of the entire ecosystem, ensuring that development does not harm the environment. The second presentation was given by Professor Álvaro Clua, who focused on the concept of the ‘General Interest’, defined as the pursuit of society's collective well-being. Through examples such as Arnstein's Ladder of Participation and Le Corbusier's Plan Voisin, he demonstrated how urban planning decisions often result from tensions among technical perspectives, public participation, and collective interests. The concept of ‘Urban Coherence’ then came under discussion, defined as a city's ability to create connections between its various parts, reducing physical and social barriers and countering urban segregation. Finally, the concept of ‘Urban Resilience’ was defined as the ability of urban environments to adapt to climate change. Recent examples, such as the extreme weather events in Valencia in 2024, highlighted the fundamental role of watercourses and natural areas in mitigating the effects of climate change.

The students' findings, in the form of keywords linked to the concept of ethics, were as follows:

Urban resilience, flood risk, biodiversity and health were perceived as central themes in the debate. From an environmental perspective, terms such as **nature and biodiversity, ecological benefits, climate crisis, ecosystems, urban climate, ecological regeneration and water resource cycle** emerged, highlighting the role of ecosystems and natural processes in urban sustainability. Concepts related to urban planning and transformation emerged, along with terms linked to risk management and climate adaptation. Another group of words concerned the social and political dimension, with concepts such as **human rights, housing policies, public space and liveability**.

What – what are we observing? – the subject of the project

At this stage, attention was focused on the system to be studied, within a specific context. To tackle the second topic, Professor Comino emphasised the importance of defining a **case study** – the first key term. Given that the teaching of ecology applied to engineering and design is offered at the Polytechnic University of Turin, the local context of reference is central in this regard. For this reason, the River Po was analysed as a case study. A description of the River Po in Turin was provided, highlighting its main characteristics, benefits, challenges and ongoing projects aimed at improving the river's ecological quality, raising awareness and fostering community involvement, thereby demonstrating how education and strategic planning can merge into active practices for caring for the local area. The second keyword, related to this topic, delved deeper into the subject, describing the morphological and hydrological characteristics of rivers. The second keyword was **'Water Quality'**. All the chemical and physical parameters described – such as pH, nutrients, dissolved oxygen and the presence of pollutants – not only describe the characteristics of the water but also directly influence river life. Water quality, in fact, determines which organisms can live, reproduce and develop within the river ecosystem. When

this balance is disrupted, the composition of biological communities also changes: some more sensitive species disappear, whilst other, more resilient ones become dominant. This leads us to the third keyword: **Biocenosis**. A biocenosis refers to the totality of species that coexist and interact within a river ecosystem. Its composition depends on both the physical and chemical characteristics of the environment and the ecological relationships among organisms. In this way, the river is no longer seen merely as a watercourse, but as a complex living system, in which every species contributes to the balance and functioning of the entire ecosystem. Professor Álvaro Clua focused in particular on **riverfronts**, that is, the areas where the city meets the river. These spaces represent the zone through which cities interact with water and can take on very different forms depending on the urban context. The concept of the **riverside** – the spaces that mediate between the city and the riverbed – was explored in depth. Riverbanks can be artificial, natural or designed using nature-based solutions, and they play a fundamental role in the relationship between the urban environment and the river ecosystem. Finally, the concept of **'itineraries and crossings'** was discussed, highlighting how bridges, pathways and public

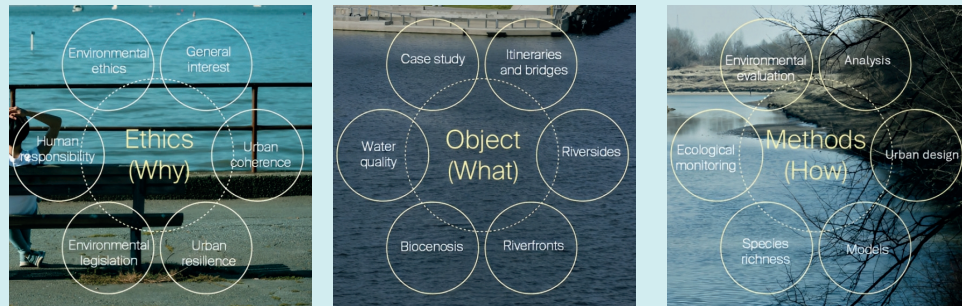
spaces are not merely functional infrastructure, but elements that enable people to engage with the water.

The students' findings, linked to the concept of 'Object', were: **infrastructure, materiality, topography, aesthetics, uses, biodiversity and context**. A key theme was biodiversity, linked to words such as **plants, marine life, ecological bridges, wetlands and environmental qualities**. The territory was also viewed as a complex system, as evidenced by the emergence of words such as **relationships, boundaries, edges, cycles, connections and transport**. Another group of words related to water and its functioning within the city includes terms such as **water flows, drainage, water bodies, safe water, reuse, and flood risk**. The urban planning and design dimension was represented by concepts such as accessibility, zoning and user experience.

How – how do we analyse these systems?

Here, we moved into the field of analytical methods and tools; the first key term Professor Comino illustrated was **environmental evaluation**. To understand a river's environmental dynamics and the effects of human activities, researchers use various analytical tools and interpretative models to systematically study the relationship between society and the environment. The European Environment Agency's DPSIR model was explained, which enables the causes and effects of environmental degradation to be represented in an integrated manner. To put these theoretical concepts into practice, ecological monitoring systems come into play; the second key term is **ecological monitoring**. These are based on the premise that a community of organisms is strongly influenced by the environment in which it lives and can therefore provide precise information on the characteristics of the river. Ecological monitoring naturally leads us to consider biodiversity, a central aspect of an ecosystem's health. Biodiversity represents the variability of living organisms and the ecological complexes of which they form part, and can be analysed at three levels: genetic diversity (diffe-

rences between individuals of the same species), species diversity (variety of living species) and ecosystem diversity, which can also be observed at the landscape level and results from the interaction between natural and anthropogenic components. We therefore introduce the third key term: **species richness**. The most commonly used parameter for measuring it is species richness, that is, the number of species present in a given space and time. From Professor Álvaro Clua's perspective, the theme of **urban analysis** emerged as an interpretative process based primarily on maps and graphical representations. He emphasised that analysis is never entirely objective, as it is always guided by specific design questions. The concept of **design** was presented as an iterative process that continually alternates between analysis and design. Designing means formulating hypotheses for transformation and constantly testing them. Finally, the concept of **modelling** was introduced, understood as the construction of physical or digital models that simulate a project's behaviour and assess its effects prior to implementation.



For the students, the key terms that emerged, linked to the concept of 'Methods', were the idea of **opportunity** – which highlights a project-based approach aimed at identifying potential and possibilities for transformation within the urban environment – and the use of **interviews** to understand people's needs, perceptions and behaviours. A first group of terms related to research and territorial analysis, such as **historical analysis, site analysis, evaluation', risk evaluation and ethnographies**, highlighting the importance of studying the context as it evolves over time. A second group highlighted methods for data collection: **surveys and interviews, taking water samples, flowmeters, sensors, and GIS or maps**.

The final stage of the session was to explain in detail to the students the task they were to carry out during the glossary sessions. They were asked to create a visual glossary of the keywords that had emerged during sessions 1, 2, 3, and 4. Specifically, an A5 booklet (separate sheets, unbound) for each keyword, consisting of:

A personal definition corresponding to the keyword (not taken from a dictionary or generated by artificial intelligence, but the result of their own interpretation after attending the lesson)

A visual element corresponding to the keyword (image, diagram, graph, collage, photograph, drawing – not generated by artificial intelligence)

The glossary was developed gradually over the course of the sessions, reflecting the teachers' different approaches, and has become an individual booklet; later (during the face-to-face week in Helsinki), it will help to create a collective concept map.

Instructions were given on how to collect the keywords to be included in the glossary; specifically, students were able to choose to include any keyword that:

came from the students themselves, their own ideas or the lecturers

had made the greatest impression on them or was most in line with the course of study

The maximum number of keywords to be included in the glossary was 40.

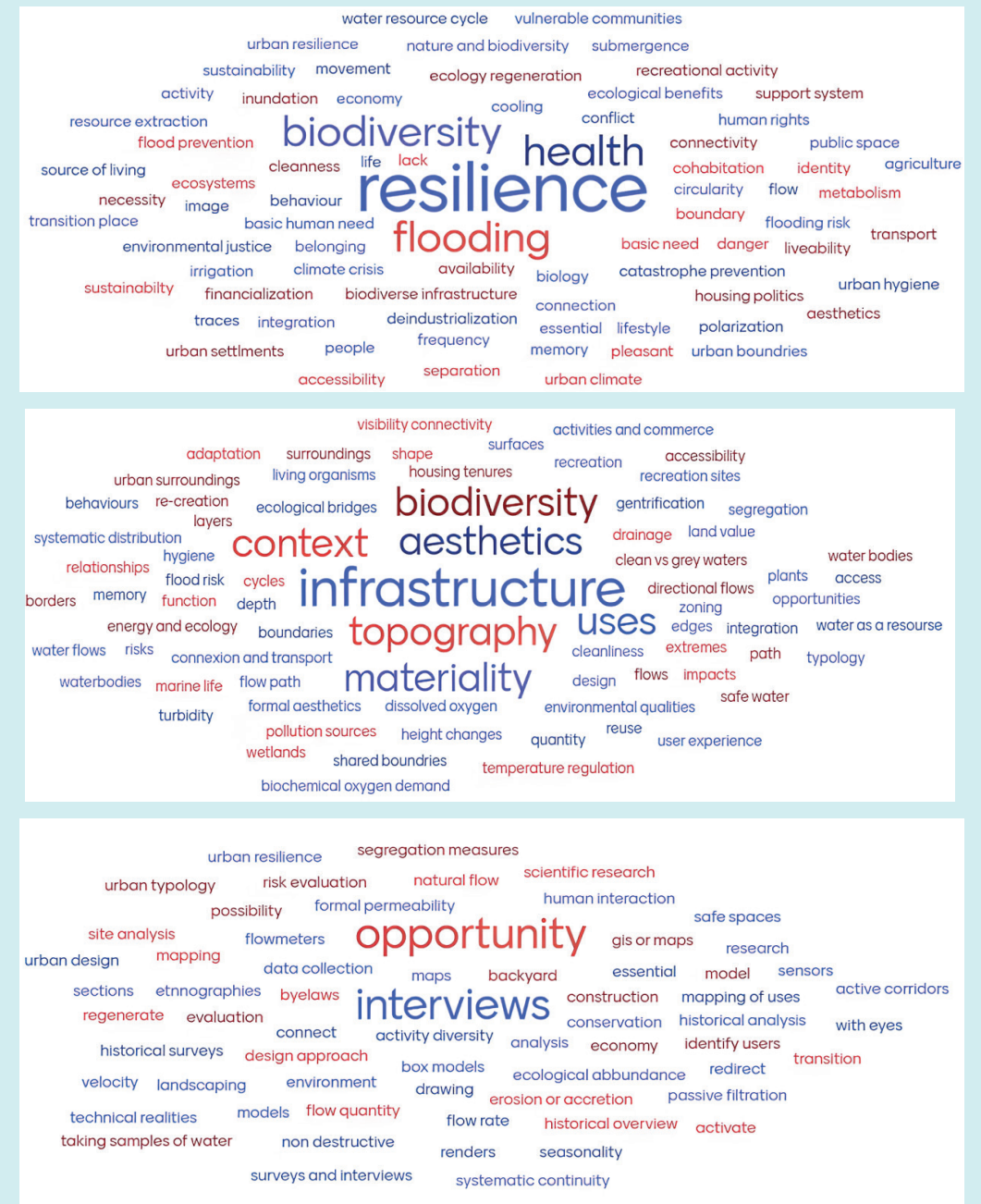
On Metacampus, the platform shared by students and lecturers, a folder has been made available containing:

The glossary layout was created in PowerPoint to ensure an accessible, editable and standardised format for everyone; the fonts to be installed on your computer, to ensure a consistent visual appearance;

An example of a completed layout:

a Word file with instructions on how to compile and export the glossary to PDF format.

At the end of the online sessions, students will upload the glossary PDF to the Metacampus platform by the specified deadline and print it before the face-to-face week (Comino & Clua).



The third session, ‘Co-designing in urban systems’, was led by Andrea Botero from Aalto University and Arnold Pears from KTH, and explored the theme of co-design in urban systems.

The main themes on which the session was based were: co-design, system(s), city, participation, collaboration, challenge and project; and the central activity, which drew on these words, was a creative exercise: ‘Interview with a Word’. Each participant chose a keyword, imagined themselves as that word, was interviewed by a fellow participant, responding as if they were the concept itself, and then the roles were swapped. The aim of the activity was to explore the different meanings behind the concepts across different disciplines, to develop listening skills and mutual understanding, and thereby to build a common language.

The interviews were based on a series of simple, personal questions, designed to make the conversation flow more naturally and help participants relate to the chosen concepts: Participation, Collaboration, City and System.

- How would your friends describe you?
- Do you connect with other people?
- Do you feel old?
- Do you have any siblings?
- Who should get to know you?
- Is there a place (or a situation) where you feel out of place?
- Are there friends you have lost?

The interviews revealed various interpretations of each concept: The concept of collaboration was associated with ideas of community, teamwork, and multidisciplinary, and was described as an inclusive, necessary, flexible, open, and relational practice. Some participants interpreted it as a practice inherent in human evolution that is still helpful in rigid or hierarchical systems today. **The term ‘participation’** was described as a tool in design processes, suitable for tackling collective problems and decision-making; associated terms included inclusivity, engagement, and involvement. Some interviewees considered it essential in fields such as design or urban planning and believed it could be enhanced by technology. **The term ‘city’** has been described in various ways: as a space of connection, an active, dy-

namic place brimming with opportunities, an organism that evolves over time, and a complex system. Indeed, the related themes were growth and transformation, networks and connections, and relationships and diversity. For some participants, the city also took on a dual character, described as crowded yet at times solitary, exclusive and inclusive, and distant from nature. **The system** was interpreted as something coherent, methodical, schematic and strategic; the words associated with it were, in fact, logical, order and organisation. From this interpretation, it emerged that the system appears to be a much more functional than emotional concept, although a relational dimension also emerged in some interviews: “I shape lives and workplaces.” “I connect through collaboration.

Th The session continued with a case study of Helsinki Bay: Töölö Bay, presented as an example of a process of transformation over time and contested civic participation, highlighting two examples situated around the bay – the Oodi Library and Happy Huone – the latter representing a spontaneous, self-managed citizens’ initiative.

At the end of the session, the Visual Glossary activity was revisited, and a task for Session Four was pre-viewed, in which each participant must:

- Choose a keyword and an image related to the theme.
- Write a brief explanation (max 100 words) of the term’s meaning within its own discipline.
- Formulate a question requiring an interdisciplinary response.
- Upload everything to Padlet with an image or drawing not generated by AI. (Botero & Pears)

CONFLUENCES SESSION #3

 Interview with a word

STEP 1: In pairs (🧑🧑) go to your breakroom, take a few moments for each person to pick one of the words/concepts (Participation, Collaboration,City ,System) and become it (= think what it is to embody and speak as that word/concept).

STEP 2: One person (🧑) act as the interviewer and the other one (🧑) acts as the keyword. Interviewers asks the word questions -becoming collaborators in making meaning- and take notes 📝 in the document

Swap roles, do the same with other keyword. around 5 min per word (time yourselves with an alarm)

STEP 3 Group debrief.

RECORD

Name of participants: A, A
Hello, city

How would your friends describe you?
They will describe me as a complex system that evolves over time

Do you connect with other words?
yes , we are on a network, we exchange ideas with people.

Do you feel old?
Kind of, because we were born a long time ago, but now i have managed to reinvent myself overtime, so we are not that old

Do you have siblings?
Yes, there are some siblings living around us on a small scale

Who should get to know you?
Most people should get to know us, they like us and they stay
Is there some place (or words) where you feel out of place?
No, i dont think so, we feel comfortable, we can adapt easily

Are there friends you have lost?
Yes, we have almost disappear because people move to other places

Figure 80. Confluences: Confluences: Interdisciplinary Visions for Water in Cities. Co-designing in Urban Systems – Session 3. (Botero & Pears, 2026)

The fourth session, 'Margin of Light',

was led by Paulo Pinho and Sérgio Proença from Aalto University and ULisboa, respectively.

This session offered a more theoretical and interpretative reflection on how the two professors observe and understand urban spaces; indeed, the two ILOs on which the session was based were: 'Co-create a shared interdisciplinary language' and 'Critically reflect on disciplinary roles in complex urban systems'. Professor Sérgio Proença, an architect and urban planner, explained that his work focuses on the meaning that spaces take on for people. The question that guides his discipline is: how do we inhabit a landscape? How can a site become a place? The tools he uses are drawing and modelling as means of understanding, explaining and designing (urban) space and landscape.

The first concept he explored was **Threshold**; understood not simply as a boundary separating two realities, but as an active space where exchanges, encounters and transformations take place. To explain this idea, he used the example of Sesimbra, a coastal town in Portugal. The images he presented showed a beach once used by fishermen and now a destination for tourism and seaside recreation. The second concept he introduced was **Temporal** (meaning 'storm' in Portuguese), referring to time. This dual meaning illustrates how the urban landscape is continually transformed by temporary, dynamic phenomena. The images depicted storms, rough seas and calm beaches. The third term presented was **Entamar**: the city intertwined with the sea. The idea he sought to convey is that the city and the sea are not two separate entities but interconnected elements; for instance, activities such as fishing have underpinned part of the local economy, whilst the morphology of the coastline has shaped the streets. From the perspective of Professor Paulo Pinho, an expert in lighting engineering; the tools he uses include photometric measurements, simulation tools, standards, experimental studies, imaging techniques and data-driven optimisation. The focus here is on three fundamen-

tal concepts: luminance, adaptation and control. On the concept of **luminance**: 'Light is not what we see; luminance is what we perceive.' In technical terms, luminance is how a surface appears bright to our eyes, and it is always influenced by boundaries, contrasts, and spatial margins. This is followed by the concept of **adaptation**, which is analysed from three perspectives: human, ecological, and technological. This concept is further illustrated with a false-colour map, which shows that luminance only acquires meaning through adaptation. Finally, control is presented as something to be managed through ecosystems, technology and policy. The parameters on which it is based are: the quantity of light produced; the spectrum – the colour of the light; the quality of the light; and time – the temporal dimension of light, which includes variations over time. The final part of this explanation focused on the transdisciplinary aspect of the terms: from Sérgio's perspective, both temporality and adaptation are present in the contemporary need to rethink and redesign our relationship with water in the urban environment. The adaptation of urban space to the dynamics of water must take into account both the linear temporal evolution of water levels and the cyclical temporal nature of tides, seasons

and life. From Paulo's perspective, the concepts of thresholds and luminance do not merely classify brightness values but also determine how urban margins become visible, interpreted, analysed, experienced and transformed. Luminance thresholds determine perceptual thresholds.

As in the other sessions, this session was devoted to compiling a shared glossary and, consequently, to using keywords. Each group chose a facilitator; every student in the group presented the term or concept they had chosen prior to the session, along with the associated image and the interdisciplinary question, all of which had been prepared as part of their assignment.

In the second phase, the group selected at least two concepts from different disciplines (pollution, biodiversity, accessibility, safety, aesthetics, governance, and environmental adaptation) and discussed: how these concepts help to understand complex urban problems; where they overlap; where they conflict; and how they can be linked. Following the discussion, the group developed a hybrid concept: a new concept arising from the integration of different perspectives, expressed in a short text. Finally, the group must upload the following to Padlet: the selected concepts, the agreed definition, and a representative image (which may be AI-generated, if desired).

The results of the first task highlighted the concept of 'Margins of Light' both as a physical phenomenon and in relation to nature and the city. An initial contribution focused on the perception and experience of urban space; concepts such as **Shadow**, **Accessibility** and **Tactility** demonstrated how light and its transformations interact with the human body. Continuing with the theme of relationships, a second strand focused on the relationship between light and the environment. Various contributions highlighted the problems caused by light, such as light pollution, which have influenced the behaviour of certain animals, whilst also simplifying human life. To address these imbalances, the concept of **Blue-Green Infrastructure** emerged, emphasising the importance of integrating vegetation and the built environment to promote biodiversity and urban resilience.

Some have also wondered how light can be interpreted as a city's identity and means of communication. The terms **Communication**, **Reflections** and **Streetscape** highlight that light can convey the relationship between the natural and urban environments.

Others have highlighted the temporal dimension of light and space through the concepts of **Seasonality** and **Hydro-seasonality**. From an engineering perspective, terms such as square metre, **signal-to-noise ratio**, and **smart lighting systems** emerged, relating to the measurement and technical management of light. Other participants focused on the concept of margins as transitional spaces. The terms **ecotone** and **terrain vague** interpret these border areas, situated on the margins, as spaces rich in biodiversity and innovation.

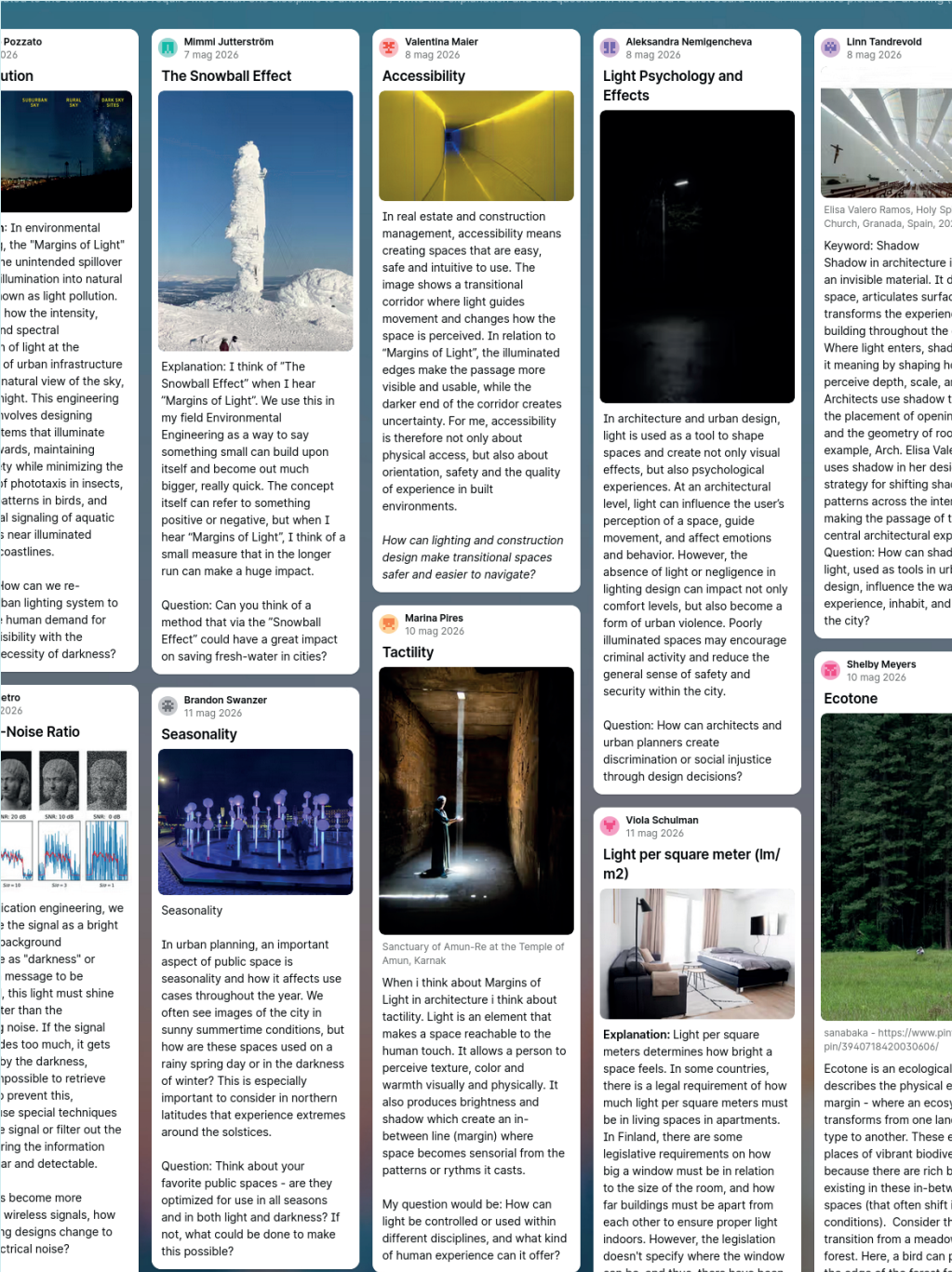


Figure 81. Confluences: Interdisciplinary Visions for Water in Cities. Margin of Light – Session 4. (Pihno & Proença, 2026)

The second activity combined different concepts to develop a new interpretation. Group one explored the theme of **reflections** as both a physical and metaphorical phenomenon. In this case, the reflection centred on the interaction between light and water is interpreted as an element that makes natural cycles, time, and the connections between the built and natural environments perceptible. The second group worked on the concept of the **commons**, combining responsive lighting, visibility, terrain vague, and blue-green infrastructure to develop a shared space accessible not only to humans but also to natural elements. In this vision, visibility enables dialogue between people, water, vegetation and the urban environment. Group 3 focused on **water seasonality**, arising from the fusion of seasonality, light psychology and vulnerability. This new definition describes how seasonal variations in water levels affect the perception, accessibility and safety of public spaces. Group 4 considered how the absence of appropriate policies can lead to cumulative negative effects, exacerbating problems such as **light pollution** and **poor-quality** built environments over time. It revisited the concepts of the snowball effect, light, environmental sustainability and quality of urban life. The final group sought to strike a balance between ecosystem protection and urban safety by revisiting the concepts of **ecotone**, **light pollution**, and **streetscape**, and by identifying urban fringes as places where the human need for visibility and safety is reconciled with the ecological need for darkness.

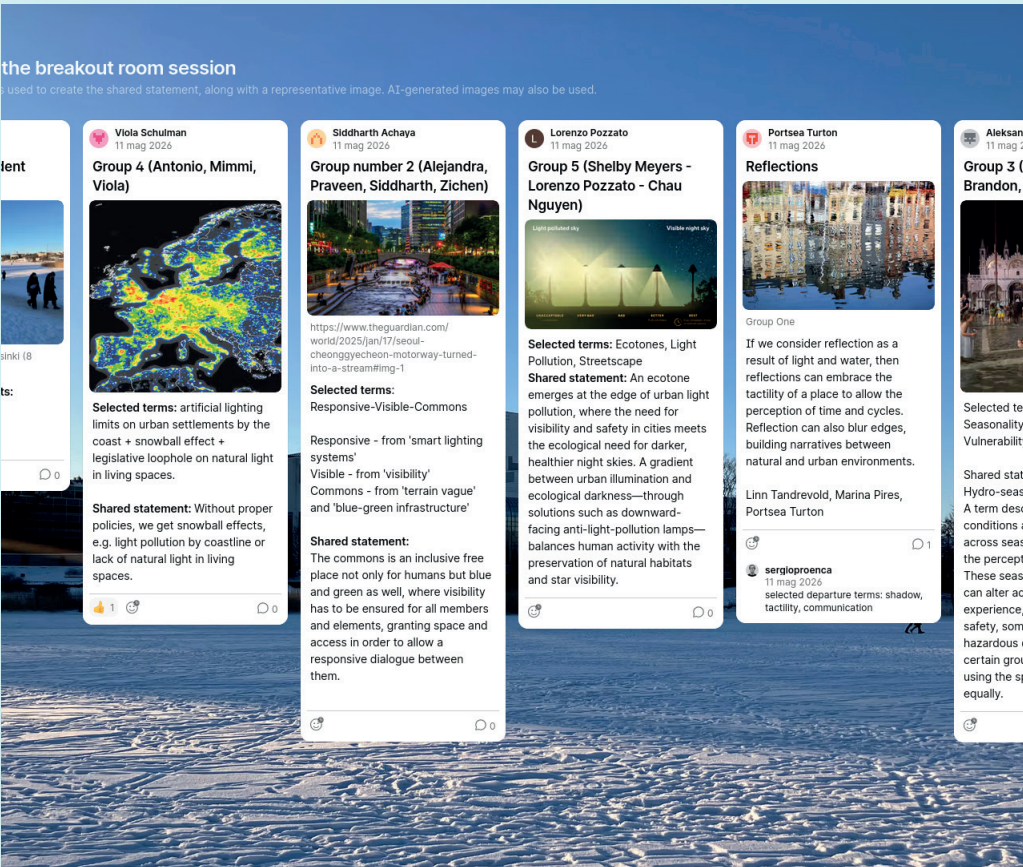


Figure 82. Confluences: Interdisciplinary Visions for Water in Cities. Margin of Light – Session 4. (Pihno & Proença, 2026)

Following the online sessions, it was possible to present preliminary results on the submission of several glossaries. At the time of analysis, 11 individual glossaries had been submitted, totalling 419 keywords collected. The quantitative and qualitative results on the sources of the keywords (lecturers, students, or personal work) and the most frequently occurring words are presented below. The analysis also enabled the identification of several shared conceptual clusters, within which the keywords selected by the students could be grouped.

The analysis yields approximate results, as in several cases the students did not explicitly indicate the source of the keywords. Of the **419 keywords** collected in total, around **230** can be traced back to the content that emerged during the online sessions. Of these, around **150 words** derive from concepts introduced by the lecturers, **60** from students' contributions and discussions, and around **70** represent personal reinterpretations. Words originating directly from the lecturers, therefore, constitute the largest category. An analysis of frequency – and thus of common words – shows that certain concepts were selected by more than one student. The **20** most frequent keywords comprise **104** terms and relate to themes such as urban resilience, interdisciplinary collaboration, co-design, and sustainability. In particular, the most frequently occurring word was **'Collaboration'** (9 times), followed by **'Threshold'** (7), **'Co-design'**, **'Participation'** and **'Control'** (6 times each). Other terms included **'Urban Resilience'**, **'Analysis'**, **'Adaptation'**, **'Temporal'**, **'System'**, **'Human Responsibility'**, **'Luminance'**, **'City'** and **'Urban Coherence'** (5 times each), and **'Infrastructure'**, **'Environmental Ethics'**, **'Resilience'**, **'Riverside'**, **'Project'** and **'Challenge'** (4 times each).

The main shared themes were divided into categories such as: **resilience and adaptation**, with words such as 'challenge', 'risk' and 'urban resilience'; the second category relates to **ecology**, with terms including 'biodiversity', 'human-nature', 'nature-based solutions', 'environmental ethics' and 'ecosystem'; the third category explores the concept of interdisciplinary collaboration with associated terms such as co-design, dialogue, collaboration and participation; a fourth category focuses on urban systems centred on the theme of water: riverfront, riverside, water quality and flood risk; and the final category describes the theme of **light and the perception of space**, featuring terms such as luminance, threshold, control and atmosphere.

Among the interdisciplinary groups that emerged, urban planning students identified most strongly with terms belonging to the fourth category; architecture students focused more on the final category, dedicated to light and space; environmental engineers contributed content related to the first, second and fourth categories; and almost all disciplines spanning engineering and architecture drew on terms linked to the third category (UNITE! European University Alliance, n.d.).

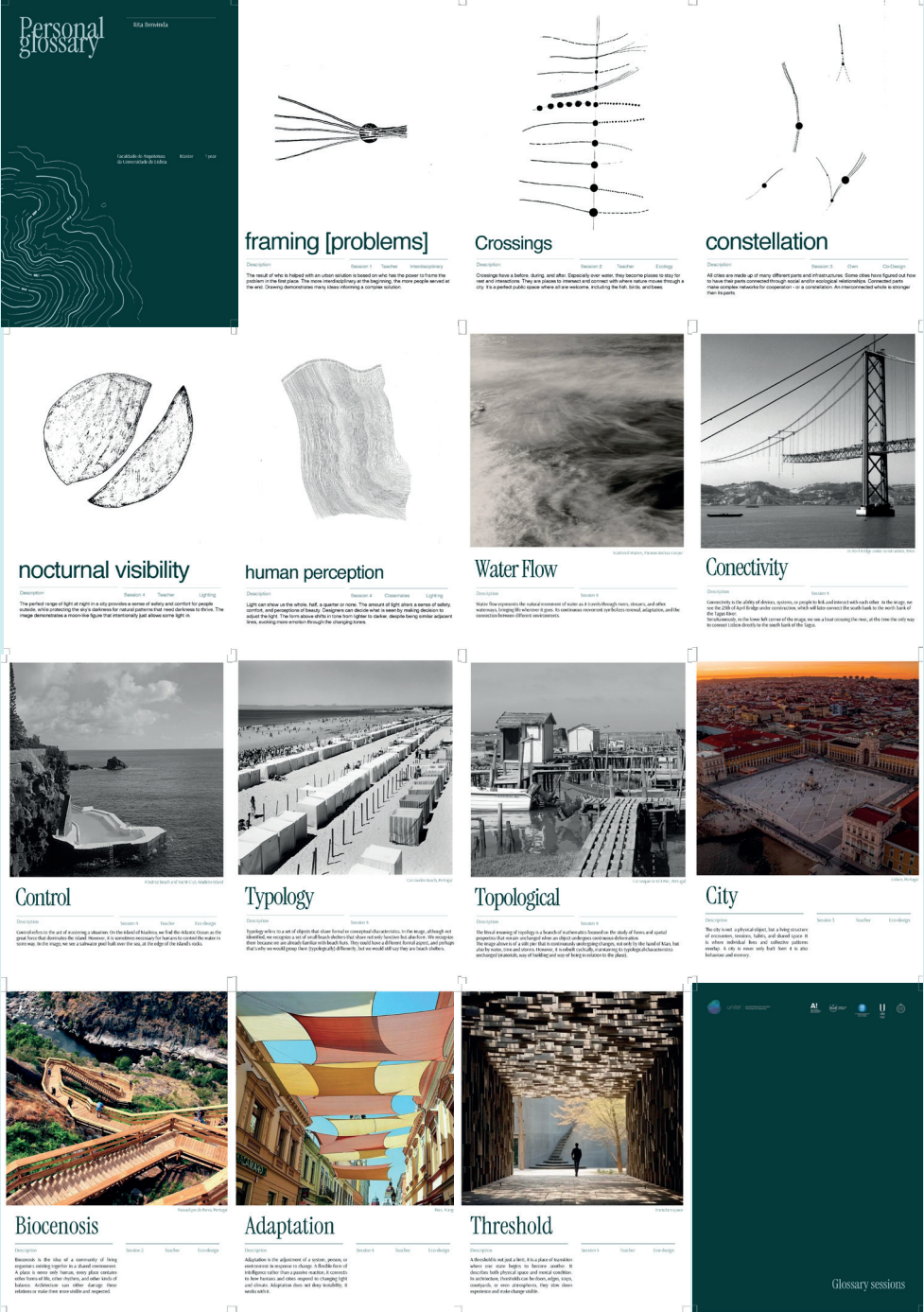


Figure 83. Results of the Glossary Activity Conducted by BIP Participants. (QUORUM Team, 2026)

Organisation of the on-site sessions for the module 8.3.3

During and following the online sessions, the team met to organise the on-site sessions for the module, which will take place in Helsinki from 3 to 7 August. Two lead tutors were appointed from among the teaching staff for each of the first five days, and each pair prepared a programme setting out the activities and materials required for the day.

The first day will be devoted to a visit to Töölö Bay, accompanied by a local expert, during which the challenges will be highlighted, and evidence documenting them will be collected. Three points where water meets the city will be identified: one related to urban planning, one to social aspects and one to ecological aspects. For each of these, a photograph will be taken and three keywords noted down (these may be taken from the glossary or be new). At the end of the day, we will reflect on why these points are significant in the context of urban water exploration. How are they connected?

“Planned” could include: designed shoreline, infrastructure, ‘controlled’ or ‘free-flowing’ water, hard or soft banks; competing uses, excluded or missing uses, risks)

“Social” could include: people making the space their own, unexpected uses, interactions with the water, accessibility, restricted use, inviting, safe, and pleasant.

The “ecological” theme could include: flora and fauna, ecological traces, aquatic organisms and materials, interactions between humans and non-humans; aspects relating to conservation and stewardship.

The tour around the bay will begin at the Oodi Central Library with a welcome session for participants, followed by a short guided tour of the library. This will be followed by a guided walk around Töölö Bay, during which the most significant sites will be highlighted, including Finlandia Hall, Hesperia Park and the area surrounding Töölö Bay, with a focus on themes such as urban biodiversity, the history of water use, and the urban, economic and cultural transformations of the area. In the afternoon, the tour will continue through the Winter Garden, the City Garden and the Linnunlaulu area, including a visit to Villa Kivi and its surroundings. The group will proceed to the Hakaniemi district, Senate Square, and Market Square, where topics related to the activities of the southern harbour, the seasonal nature of urban spaces, and the cultural history of the Baltic Sea will be explored in greater depth. The day will conclude with a bus tour focusing on urban transformation and the city's climate resilience. The tour will visit several significant areas of Helsinki, including Kaivopuisto, the Löyly sauna, Jätkäsaari, Lapinlahti, Sibelius Park and the former Lapinlahti psychiatric hospital. The coordinators for this session will be Christine Mady and Paulo Pihno.

The morning of the second day will begin with a summary of the first day, an overview of the second day's programme and an in-depth look at the final outcome. The presentations will feature experts, including specialists from the **Urban Environment Division of Helsinki City Council**; a project manager (A Insinööri) for the **lighting of Töölö Bay**; and a **PhD researcher in water and environmental engineering** from the Department of the Built Environment, Faculty of Engineering, at Aalto University. The findings of the research conducted for this thesis will be presented with a focus on the **module's co-design, collaborative learning, and ecological analysis**. The perspective of systemic design will also be illustrated as a framework for analysing the Helsinki Bay case study, highlighting the relationships between the ecological, urban, social and cultural components that characterise the context under analysis. Work will focus on the **glossary and**

the activity arising from the site visit, with five groups concentrating on themes based on the five stakeholders of the bay: water, birds, soil, children and trees, to encourage them to think from a different perspective. The glossaries will be examined using the ‘Gallery Walk’ method, followed by a short microlearning session covering shift timings, and a subsequent debriefing based on selected extracts from the participants' glossaries.

A puzzle map (2x2m) of Töölö Bay will be shared, onto which participants will add Post-it notes using two colours to identify weaknesses and opportunities, along with all the material they manage to collect over the course of the days.

The third day will be devoted to the planning phase, that is, starting to work towards the outcome expected on the fifth day. The morning will begin with a second visit to the bay, with more specific objectives in mind. Each group will be assigned a word/verb/action (float, play, rest, walk, work) and will receive an A3-sized map of the bay. The map will include a layout of the bay, the actions, the ecosystem services wheel and the task for the day. Each group will use the morning to identify events related to their action and to put the action into practice in Töölö Bay. **The actions should be mapped** and documented using photographs and short video clips; one or more schematic diagrams on a scale of 1:200 should be drawn up to support subsequent work; and work should be carried out on the ecosystem services wheel. In the afternoon, the material collected will be reworked to produce: a short video (between 60 and 120 seconds) illustrating the word / verb / action in Töölö Bay; an illustrative collage of the word / verb / action in Töölö Bay (how might this action exist in Töölö Bay in the future); a poem or poetic text expressing a vision for the future or a wish for Töölö Bay from the perspective of the word, verb or action.

This material will be used to answer the final question: What is the most effective tool for visualising possible future scenarios for the bay based on the identified actions? This will be followed by an exhibition, a presentation, and a discussion of the day's results.

The fourth day will be devoted mainly to **independent group work**, with the tutors present acting as facilitators. The ultimate aim will be to develop future scenarios, strategies, processes and collaborative visions for the bay. Participants will collaborate to develop new scenarios or projects for Töölö Bay. During the day, guidance will be provided on what students are expected to have completed by the end of the day. The format of the final presentation is open: posters, debates, videos, presentations, etc.

The most plausible outcome over the five days is a comparison between the participants' initial perception of the bay upon arrival and how that perspective has changed throughout the activities. On this basis, the ultimate aim is to envisage a different future, rather than to solve a specific problem. There are five teams, and around 30 minutes will be allocated to each presentation (covering the process, with a brief section on the vision and format); there will also be discussions, as in a workshop, to see how they worked together and reached a shared understanding. The fifth day will therefore be devoted to the final presentations and celebrations (QUORUM Team, UNITE!, 2026).

On-site Session-Flow Map

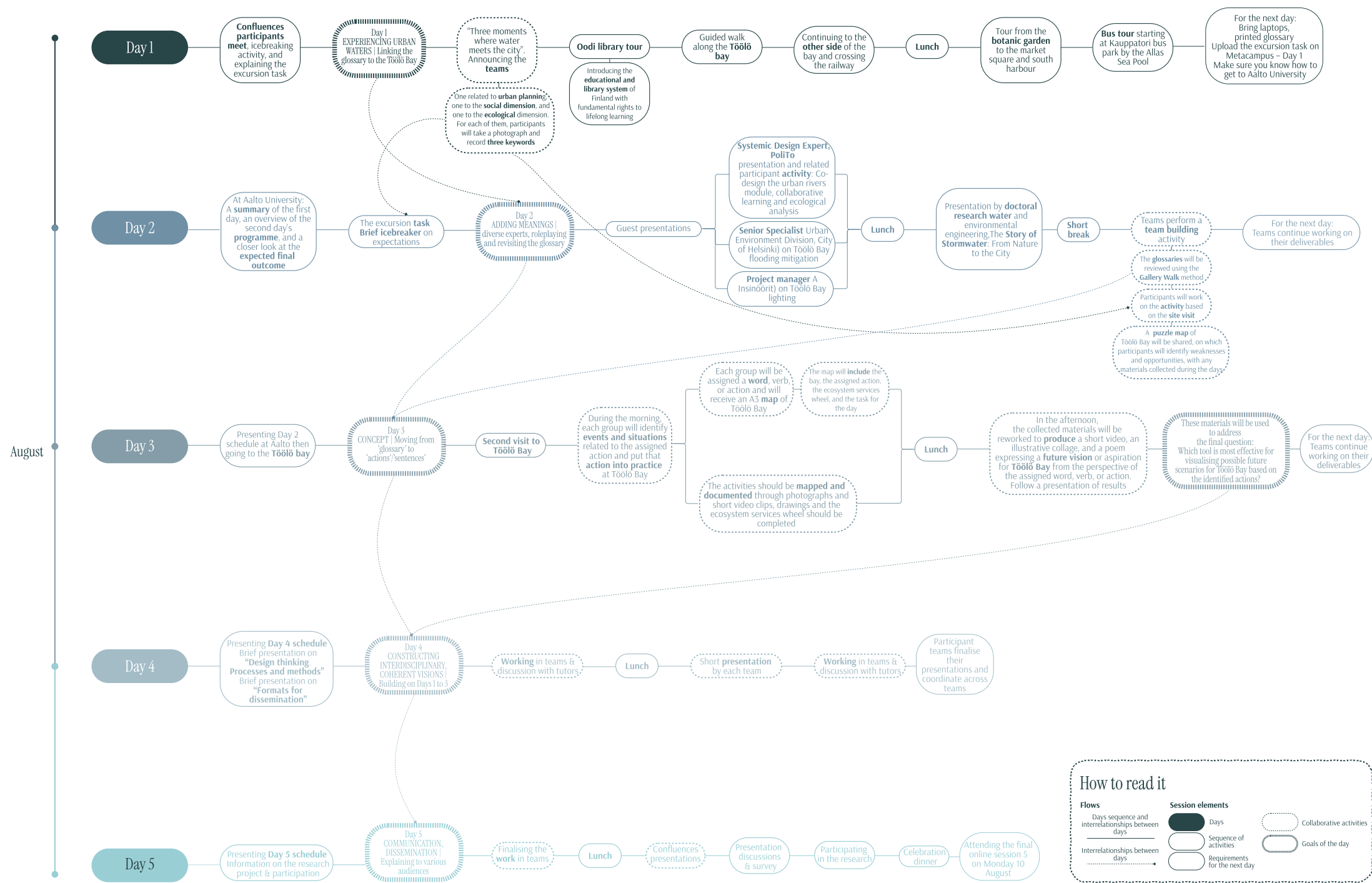


Figure 84. QUORUM Project, Onsite Structure, 2026.

Day 3 – CONCEPT

Moving from ‘glossary’ to ‘actions’/’sentences’

Ecosystem Services

Ecology examines the relationship between the living and non-living at different scales, from the individual organism to the biosphere. The **planet** is an intricate and dynamic interplay of living and non-living components, including the physical environment itself.

What ecology concern?

Organisms and their habitats, the roles that these life forms play within their habitats as well as to the natural **bio-geochemical cycles** (water, oxygen and carbon, nitrogen, et al.) that are critical to supporting all life on the planet (Comino, E., & Dominici, L. (2025–2026). *History of Ecology [Lecture]*. Politecnico di Torino).

Action Exploration



FROM MACRO
Explore Töölö Bay by observing situations, places, and activities that express the assigned action, following the detailed instructions provided on the back of the worksheet.



TO MICRO
Analyze Töölö Bay using the Ecosystem Services Wheel to explore the relationships between the assigned action and the elements present in the area.

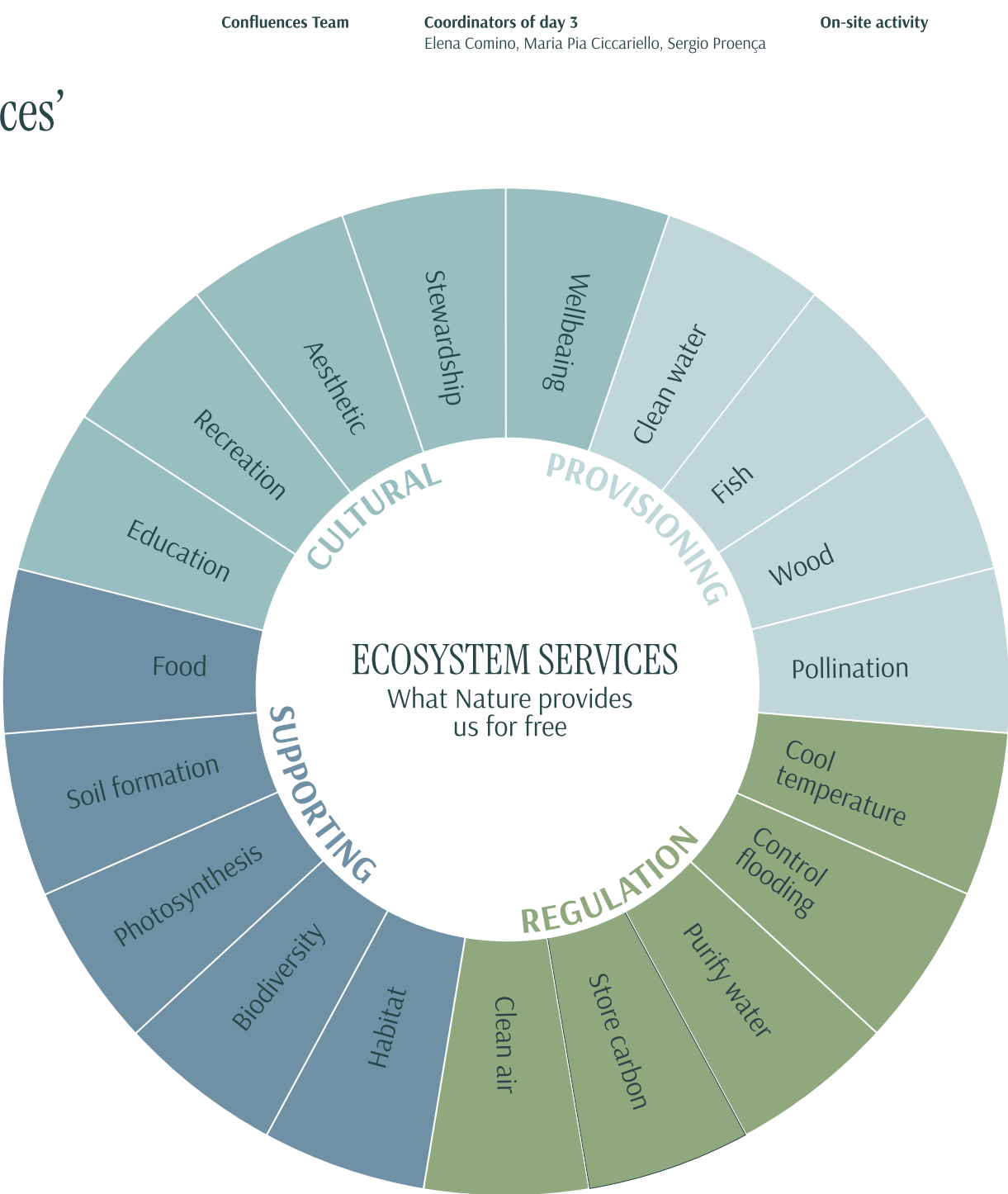
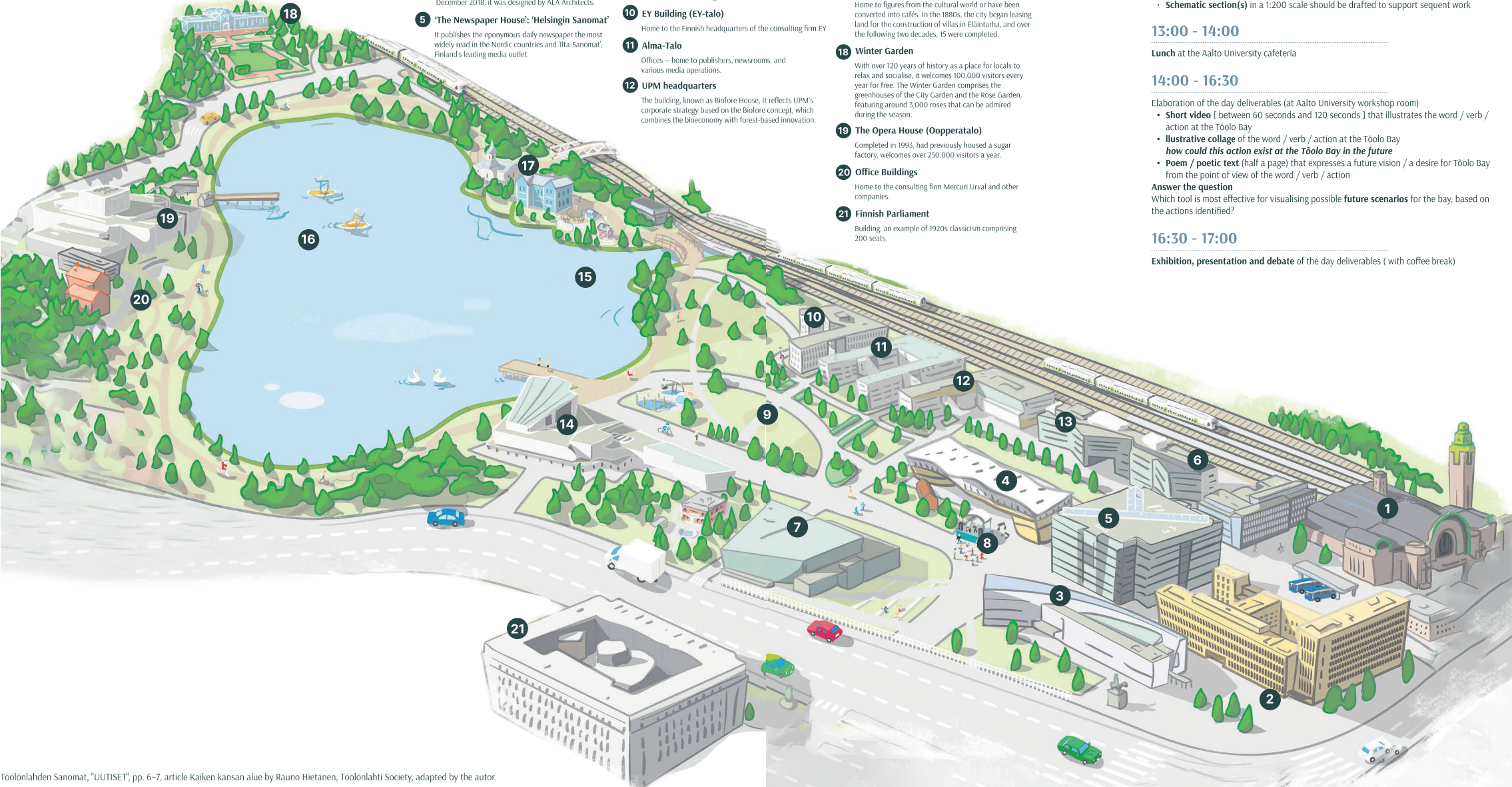


Figure 85. QUORUM Project, Map of Day 3 On-site Activities, 2026 - Front

Töölönlahti Bay

The name ‘**Töölö**’ derives from the Swedish ‘**Tölö**’, referring to the original farming community that occupied the area; the bay served as a **natural** harbour for small fishing boats and had a wide opening to the sea, supplying fresh water to the various rural settlements during the 17th century. As the city of Helsinki grew, **Töölönlahti Bay** began to transform into an expanding **urban centre**.



- 1 Rautatieasema railway station**
Was designed by the architect Eliel Saarinen in the early 1900s; it serves 250,000 passengers a day, with around 850 local trains and over 100 national long-distance trains passing through.

2 General Post Office: 'Postitalo'
Completed in 1938, previously housed only postal and telegraph services, and it was one of the most prominent and significant public building projects in the capital of independent Finland.

3 Museum of Contemporary Art: 'Kiasma'
Houses around 8,800 works; these are the subjects of research and academic publications that explore their cultural and historical significance in depth.

4 The Helsinki Central Library: 'Oodi'
Is one of the most significant examples of contemporary Finnish architecture. Completed in December 2018, it was designed by ALA Architects.

5 'The Newspaper House': 'Helsingin Sanomat'
It publishes the eponymous daily newspaper the most widely read in the Nordic countries and 'Iltä-Sanomat', Finland's leading media outlet.

6 Holiday Inn hotel
The ground floor houses the SportPub Chelsea restaurant. Other occupants include Visma and several other businesses.

7 'Musikkitalo'
Helsinki's musical heart: it hosts 1,000 concerts and events a year, is the home of the Helsinki Symphony Orchestra, the Radio Symphony Orchestra and the Sibelius Academy.

8 Citizens' Square
It hosts a wide range of events, from short-term demonstrations to multi-day festivals.

9 Töölönlahdenpuisto Park
Forms the principal green space surrounding the bays of Töölönlahti and Eläintarhanlahti in the Kallio district, east of the bay. Spanning 8.8 hectares, it is bordered by several cultural venues and serves as a new oasis for city events and leisure along the southern shore.

10 EY Building (EY-talo)
Home to the Finnish headquarters of the consulting firm EY.

11 Alma-Talo
Offices – home to publishers, newsrooms, and various media operations.

12 UPM headquarters
The building, known as Biofore House, it reflects UPM's corporate strategy based on the Biofore concept, which combines the bioeconomy with forest-based innovation.

- 13 KPMG headquarters**
KPMG's approach to architecture places a strong emphasis on social responsibility, envisioning buildings as "infrastructure for happiness."

14 Finlandia Hall (Finlandia-talo)
Completed in 1971 by the architect Alvar Aalto, welcomes 200,000 visitors a year and has hosted 800 events.

15 Park Area
Includes a playground, an activity trail and hosts a variety of events.

16 Töölönlahti Bay
Located in the heart of Helsinki, measures 650 metres in length, 200–300 metres in width, and reaches a depth of up to 2 metres. It is connected to the Baltic Sea by a narrow channel.

17 Villas
Home to figures from the cultural world or have been converted into cafés. In the 1880s, the city began leasing land for the construction of villas in Eläintarha, and over the following two decades, 15 were completed.

18 Winter Garden
With over 120 years of history as a place for locals to relax and socialise, it welcomes 100,000 visitors every year for free. The Winter Garden comprises the greenhouses of the City Garden and the Rose Garden, featuring around 3,000 roses that can be admired during the season.

19 The Opera House (Oopperatalo)
Completed in 1993, had previously housed a sugar factory, welcomes over 250,000 visitors a year.

20 Office Buildings
Home to the consulting firm Mercuri Urval and other companies.

21 Finnish Parliament
Building, an example of 1920s classicism comprising 200 seats.

Day 3 guidelines

09:00 - 12:30

Day **briefing** on the bay at Aalto University workshop room

Path on the **Töölö Bay**

- Each group is assigned with one word/verb/action (**floating ; playing ; resting ; walking ; working**) each group (each student) receives one map of the bay (copy of the **puzzle map** in a portable dimension (A3))
- Distribution of the **day package** containing: one map of the bay, the wheel of Ecosystem services and the guidelines for the assignments of the day
- The group will use the morning to find events of the **assigned action** and to practice/ experiment the action at the Töölö Bay
- The actions should be mapped and registered in **photographs and short videoclips** (these actions can be attributed to people, animals, plants or any other element present in the urban landscape)
- Schematic section(s)** in a 1:200 scale should be drafted to support sequent work

13:00 - 14:00

Lunch at the Aalto University cafeteria

14:00 - 16:30

Elaboration of the day deliverables (at Aalto University workshop room)

- Short video** [between 60 seconds and 120 seconds] that illustrates the word / verb / action at the Töölö Bay
- Illustrative collage** of the word / verb / action at the Töölö Bay **how could this action exist at the Töölö Bay in the future**
- Poem / poetic text** (half a page) that expresses a future vision / a desire for Töölö Bay from the point of view of the word / verb / action

Answer the question

Which tool is most effective for visualising possible **future scenarios** for the bay, based on the actions identified?

16:30 - 17:00

Exhibition, presentation and debate of the day deliverables (with coffee break)

Töölönlahden Sanomat, "UUTISET", pp. 6–7, article Kaiken kansan alue by Rauno Hietanen, Töölönlahti Society, adapted by the author.

Figure 85. QUORUM Project, Map of Day 3 On-site Activities, 2026 - Back

WP3 – Module Communication

8.4

Work Package WP3 was coordinated by Professor Arnold Pears from KTH. The work package involved sharing the project's experience with the UNITE! Community. It comprised two key milestones: the organisation of a webinar, completed on 12 March 2026, and a presentation at the AMPS conference, held in June 2026, titled "A Focus on Pedagogy". The conference presentation provided an opportunity to develop an article for an academic journal, which is expected to be completed by the end of 2026. As part of the research to support the article, during the face-to-face phase of the teaching module, we plan to collect qualitative data through interviews with participants (QUORUM Team, UNITE!, 2026).

Sharing the project with the Unite! community

8.4.1

The conference – the Virtual Education Summit: The 3rd Unite!-Ed Future Conference – was organised to present Unite!'s seed-funding projects and provided an opportunity to share experiences and network with colleagues from Unite! alliance. The Confluence module was presented, introducing the project team and outlining the planned course type, learning objectives, main themes, and expected outcomes (QUORUM, UNITE!, 2026, Appendix 4).

Participation in the AMPS conference

8.4.2

At the AMPS conference, the module was presented during the session 'Experimental pedagogies and innovative teaching – Sustainability & Resilience: from integrating the SDGs into curricula to ensuring support for sustainable teaching and learning practices for both educators and students'. An abstract of the project was submitted for the conference, focusing on interdisciplinary learning. The aims and expected outcomes, the skills, the pedagogical models and how the Confluences module fits within this framework were described; particular emphasis was placed on the development of a common language (QUORUM, UNITE!, 2026, Appendix 7).

Objectives and next steps

8.4.3

The team discussed the next stages of the collaboration, which include further iterations of the BIP and applying for funding to continue developing the proposed framework for collaborative and interdisciplinary communication in learning and research. The intention is to decide on a potential application towards the end of 2026, following the publication of the scientific article, which will be drafted after the completion of the BIP (QUORUM Team, UNITE!, 2026), and to explore the possibility of organising a second edition of the programme, entrusting its coordination to another partner university in the Unite! network, such as the Polytechnic University of Turin or the Universitat Politècnica de Catalunya.

Conclusion

The thesis project documented the co-design process for the Confluences module within the QUORUM project, enabling an in-depth exploration of cross-disciplinary and cross-cultural collaboration, the discovery of innovative teaching methods, and a deeper understanding of the pedagogical perspective. It also provided a thorough understanding of the environmental and urban aspects experienced by cities. The research explored the role of water and its behaviour within urban ecosystems, using Helsinki Bay as a case study, and this analysis was enriched by social, economic, and cultural considerations. This interpretation was made possible by the eco-design approach and engagement with diverse disciplines, which helped develop a broader, more systemic understanding of the context. One of the main findings concerned the value of the systemic approach as a tool for interpreting and managing complexity. Systemic design and eco-design made it possible to view water not as an isolated element, but as part of a larger system of relationships. Systemic thinking also proved particularly useful within the international working group, acting as a unifying force that facilitated dialogue among the various areas of expertise involved and helped build a shared vision of the project. From a critical perspective, the project highlighted both the potential and the complexities of interdisciplinary and international collaboration. Among the most significant aspects was the module's ability to create a space for interdisciplinary dialogue, fostering a common language and a shared vision of water-related urban challenges. However, the process also highlighted challenges in coordinating with international institutions to incorporate and deliver the teaching module, and in translating specialist concepts into teaching tools accessible to all. From a professional perspective, the thesis demonstrated how a designer can serve as a facilitator in complex contexts, helping forge connections between people and places. My direct involvement in the module's development enabled me to contribute content on ecology and eco-design, explore the role of water and ecosystem services in urban contexts, and translate this knowledge into teaching materials and activities. Within the working group, I often acted as a liaison among the professors, fostering dialogue across specialist areas and helping build a shared vision for the course. At the same time, my involvement in the international group's activities enabled me to develop transferable skills in interdisciplinary collaboration, intercultural communication, and the management of complex design processes, which will also be valuable in my future career.

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Chapter 2

Figure 12. IDEO and Stanford d.school, Design Thinking Process Steps, in *Design Thinking Process Steps*, n.d., adapted by the author.

Figure 13. Goodman Michael, Systems Thinking Model, in *Systems Thinking Model*, 2002, adapted by the author.

Figure 14. Tahtinen Lassi, Futures Studies as a Discipline, in *System Thinking Model*, Urban Challenge Studio course, Aalto University, 2025, adapted by the author.

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Chapter 3

Figure 17. Author’s elaboration, Network representation of the universities participating in the QUORUM project within the UNITE! European University Alliance, 2026, adapted by the author.

Chapter 4

Figure 18. United Nations, Sustainable Development Goals relevant to urban water systems: SDG 3 (Good Health and Well-being), SDG 6 (Clean Water and Sanitation) and SDG 11 (Sustainable Cities and Communities), 2015.

Figure 19. Peruccio Pier Paolo, Dubai Coast, in *Theory and History of Design, Architecture* 2025, Politecnico di Torino, 2025.

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Figure 22. DE URBANISTEN, Tidal Park Keilehaven, Rotterdam, in *Tidal Park Keilehaven*, 2024.

Figure 23. Flussbad Berlin, Fluss Bad Berlin, in *Fluss Bad Berlin*, 2024.

Figure 24. An overview of the “Am Seebogen” neighborhood in Vienna, Austria. (Nolting Ingmar Björn, 2022)

Figure 25. Rizzuti Cristian, Reflection, in *Reflection*, 2022.

Figure 26. Dipartimento di Pianificazione, Design, Tecnologia dell’Architettura (PDTA), RivEr/Generation_LAB Call, in *Barada RivEr/Generation_LAB*, Sapienza Università di Roma, n.d.

Figure 27. Groundwork Hudson Valley, Science Barge, in *The Science Barge*, n.d.

Figure 28. Brigham Jonee Kulman, Students from River’s Edge Academy Collect Water Quality Data at Sucker Lake, in *River Journey: Art-led, Place-based, Experiential Environmental Education, Journal of Sustainability Education*, 2016.

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Figure 30. Urban Water Lab, Urban Water Lab, in *Urban Water Lab – Urbanization Deeply Alters the Water Cycle Processes*, Politecnico di Milano, n.d.

Figure 31. CS4RIVERS, Macroinvertebrate Community Monitoring , in *CS4RIVERS Project*, n.d.

Figure 32. Università Iuav di Venezia, Venice Water Lab, in *Venice Water Lab – Polo dell’acqua*, Università Iuav di Venezia, n.d.

Chapter 5

Figure 33. Norwegian University of Science and Technology, Taxonomy of Cognitive Learning Levels for Intended Learning Outcomes, in *Writing Effective Intended Learning Outcomes (ILOs)*, 2026,adapted by the author.

Figure 34. Norwegian University of Science and Technology, Taxonomy of Affective Learning Levels for Intended Learning Outcomes, in *Writing Effective Intended Learning Outcomes (ILOs)*, 2026, adapted by the author.

Figure 35. Norwegian University of Science and Technology, Taxonomy of Psychomotor Learning Levels for Intended Learning Outcomes, in *Writing Effective Intended Learning Outcomes (ILOs)*, 2026, adapted by the author.

Figure 36. Norwegian University of Science and Technology, Constructive Alignment Matrix, in *Writing Effective Intended Learning Outcomes (ILOs)*, 2026, adapted by the author.

Figure 37. Ilmara K., Altinay F.,Assessment Tools Proposed or Used to Evaluate the Development of Sustainability Competencies, in *Integrating Education for Sustainable Development Competencies in Teacher Education*, 2021, adapted by the author.

Chapter 7

Figure 38.Töölön Viheraluesuunnitelma, Hesperian Puiston Rannan Kunnostuksen Yleissuunnitelma, 10 October 2001.

Figure 39. Brander Signe, View of Töölönlahti and the Töölö District, Helsinki, in *Finna Digital Collections*, 1908.

Figure 40. View of Töölönlahti and the Töölö District. (Brander Signe, 1908.

Figure 41. Photograph by the author, Töölönlahti bay, 2026.

Figure 42. Photograph by the author, Finlandia Hall, 2026.

Figure 43. Photograph by the author, The Opera House, 2026.

Figure 44. Photograph by the author, Oodi, 2026.

Figure 45. Photograph by the author, Oodi, 2026.

Figure 46. Photograph by the author, Töölönlahdenpuisto Park, 2026.

Figure 47. Pocket Gardens in Töölönlahdenpuisto Park. (City of Helsinki, n.d.)

Figure 48. Photograph by the author, Villas, 2026.

Figure 49. Photograph by the author, Winter Garden, 2026.

Figure 50. Photograph by the author, Töölönlahti Bay, 2026.

Figure 51. Aalto University, Research and Art: Focus of Development – Driving Excellence, in *Aalto University*, n.d.

Figure 52. Aalto University, Aalto University strategy, in *Aalto University*, n.d, adapted by the author.

Figure 53. Photograph by the author, Aalto University, 2026.

Chapter 8

Figure 54. QUORUM team, The team's presentations redistributed to categories using Miro board, in *Unite! Seed Fund Technical Report: Quest for Urban Obdurate Resilience in Uncertain Milieus*

Figure 55. QUORUM team, Combining terms and categorising them using Miro board, in *Unite! Seed Fund Technical Report: Quest for Urban Obdurate Resilience in Uncertain Milieus (QUORUM)*, Appendix 1 (WP1 Report), 2026.

Figure 56. QUORUM team, The ten terms per team member compared, in *Unite! Seed Fund Technical Report: Quest for Urban Obdurate Resilience in Uncertain Milieus (QUORUM)*, Appendix 1 (WP1 Report), 2026, adapted by the author.

Figure 57. Photograph by the author, Panoramic photo of the meeting room with equipment, 2025.

Figure 58. QUORUM Project, Teachers Workshop Template, in *WP2: Co-design the Urban Rivers Module Workshop Materials*, 2025.

Figure 59. QUORUM Project, Teachers Workshop Template, in *WP2: Co-design the Urban Rivers Module Workshop Materials*, 2025.

Figure 60-62. QUORUM Project, Results of groups, in *WP2: Co-design the Urban Rivers Module Workshop Materials*, 2025.

Figure 63-64. Photograph by the author, Workshop session with students, 2025.

Figure 65. Photograph by the author, Dragon Boat with QUORUM team, 2025.

Figure 66-69. QUORUM Project, Ring model - Contribute Insight, Keywords Glossary in *WP2: Co-design the Urban Rivers Module*, 2025.

Figure 70. QUORUM Project, Ring model - Understanding Learning & Improving Practice, Keywords Glossary in *WP2: Co-design the Urban Rivers Module*, 2025.

Figure 71. QUORUM Project, Online Structure in *WP2: Co-design the Urban Rivers Module*, 2026.

Figure 72. QUORUM Project, Publication of the application form, in *Aalto University*, 2025.

Figure 73. QUORUM Team, CONFLUENCES_INFO-PACK, in *Aalto University*, April 2026.

Figure 74. QUORUM Team, CONFLUENCES_INFO-PACK, in *Aalto University*, April 2026.

Figure 75. Mady & Pears, Confluences: Interdisciplinary Visions for Water in Cities. Session 1 – Opening Session, in *QUORUM*

team, April 2026.

Figure 76-77. Mady & Pears, Confluences: Interdisciplinary Visions for Water in Cities. Session 1 – Opening Session, in *QUORUM team*, April 2026.

Figure 78. Comino & Clua, Confluences: Interdisciplinary Visions for Water in Cities. From Human Responsibility to Infrastructure – Session 2: Glossary 1, in *QUORUM team*, April 2026.

Figure 79. Comino & Clua, Confluences: Interdisciplinary Visions for Water in Cities. From Human Responsibility to Infrastructure – Session 2: Glossary 1, in *QUORUM team*, April 2026.

Figure 80. Botero & Pears, Confluences: Interdisciplinary Visions for Water in Cities. Co-designing in Urban Systems – Session 3, in *QUORUM team*, April 2026.

Figure 81-82. Pihno & Proença, Confluences: Interdisciplinary Visions for Water in Cities. *Margin of Light – Session 4*, in *QUORUM team*, April 2026.

Figure 83. QUORUM Team, Results of the Glossary Activity Conducted by BIP Participants, in *CONFLUENCES: Interdisciplinary Visions for Water in Cities*, Unite! Metacampus, 2026.

Figure 84. QUORUM Project, Onsite Structure, in *CONFLUENCES: Interdisciplinary Visions for Water in Cities – On-site Sessions*, 2026.

Figure 85. QUORUM Project, Map of Day 3 On-site Activities, in *CONFLUENCES: Interdisciplinary Visions for Water in Cities – On-site Sessions*, 2026.

