

## NBS EduWORLD - Project Education Learning Unit Overview

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### Learning Unit (LU) Planning Template - High Level Overview

Name of Learning Unit (LU) Topic		Future of Cities					
NBS Context (e.g. urban rural, coastal)	NBS keywords <b>complete checklist at the end of the document</b>	Other Keywords (topics other than NBS) <b>add in Other below</b>	Linked or complementary concepts to NBS (to assist curriculum integration)	Prior learner knowledge of NBS (high, moderate, low/none)	Prior instructor knowledge/ skills/ competences of NBS or equivalent	Key EU NBS resources used (for instructor preparation) include link	Type of LU - lecture, workshop, field trip/site visit
any				moderate	moderate		Lecture
Target academic subject / discipline / professional area or group	Target learners/ groups [age range of learners] if applicable	Min/ Max # of learners (if applicable)	Sector (e.g, professional, higher education, community)	Prerequisites required of learners if applicable (education)	EQF (European Qualifications Framework) level (or Irish NFQ) indicative only	Time for LU (aim is 50 minutes per learning unit)	Course delivery format (e.g. in-person, hybrid, online)
General	Undergraduate	n/a	professional or higher education		EQF 6 - Irish NFQ 7/8 Ordinary/H	50 minutes	Hybrid
Overall Purpose	This unit explores how Nature-Based Solutions (NBS) and smart technologies are transforming urban environments to be more resilient and sustainable. It focuses on the integration of nature in smart cities through green infrastructure, data-driven decision-making, and						
LU Summary (2-3 sentences)	This unit delves into the future of cities, emphasizing the integration of Nature-Based Solutions (NBS) with smart technologies to create sustainable, resilient urban environments. Students will explore how EU-funded projects and nature-inspired technologies contribute to urban sustainability and how challenges like space constraints, costs, and public perception impact implementation.						
Learning Outcome 1	Define Nature-Based Solutions (NBS) and smart technologies and explain their roles in creating sustainable cities.						
Learning Outcome 2	Identify EU-funded projects and explore how they integrate NBS and smart technology to address urban challenges.						
Learning Outcome 3	Analyze the challenges and opportunities of implementing NBS and smart technologies in cities, focusing on public perception, management complexity, and policy support.						
Learning Outcome 4							

## Activities and Elements of Learning

*Aim that each learning unit include at least 4 activities for an interactive learning experience*

Time (duration of activity)	Aims - linked to NBS concepts or topics)	Link to Learning Outcome	Learning Activity [PPT Slide # - if applicable]	Teacher action/activity (Learner action/activity)	Confirmation of learner's learning (assessment of learning)	Link to online NBS resources (and/or academic resources with DOI as relevant)	Offline resources and materials (e.g. post-its,)
15 minutes	Introduce Nature-Based Solutions (NBS) and smart technologies in the context of urban sustainability.	1	Introduction to NBS and smart cities [Slides 2-5].	Define Nature-Based Solutions and smart cities, explaining how data-driven decision-making and green infrastructure contribute to sustainable urban development. Discuss examples of nature-inspired technologies such as biomimicry and renewable energy solutions.	In class discussion are designed to engage students; Learners respond to the questions and the teacher will determine understanding from their responses		Post-it notes for a <b>brainstorming exercise</b> on <b>NBS concepts</b> and how they might apply to local urban challenges.

15 minutes	Explore EU-funded projects that integrate NBS with smart technologies to tackle urban challenges.	2	Case study of EU-funded projects [Slides 6-12].	Present case studies such as CIVITAS, LIFE Urban Green, and Green4CITIES, focusing on their approach to smart mobility, energy management, and green infrastructure. Discuss smart grids, smart monitoring, and how IoT sensors help monitor and optimize urban sustainability.	Group exercise where students are tasked with analyzing one of the presented EU projects and discussing its impact on climate resilience and urban sustainability designed to engage students; Learners respond to the questions and the teacher will determine understanding from their responses		Post-it notes for a brainstorming exercise on NBS concepts and how they might apply to local urban challenges.
15 minutes	Discuss the <b>challenges</b> and <b>opportunities</b> of integrating <b>NBS</b> and <b>smart technologies</b> into urban systems.	3	SWOT analysis of NBS and smart cities [Slides 13-16].	Lead a discussion on the challenges of scaling up NBS and smart technologies, focusing on cost, space constraints, and regulatory barriers. Discuss the opportunities presented by public-private partnerships, policy support, and community engagement in overcoming these challenges.	In class discussion are designed to engage students; Learners respond to the questions and the teacher will determine understanding from their responses		Post-it notes for a brainstorming exercise on NBS concepts and how they might apply to local urban challenges.

5 minutes	Wrap up the session and ensure that all key learning points have been understood.	1, 2, 3	Open Discussion	Open the floor for questions and provide clarifications on any complex concepts discussed in the session. Encourage students to reflect on how the integration of NBS and smart technologies can shape the future of cities.	Teacher will ask follow-up questions based on students' responses to ensure key learning outcomes have been achieved. Give instant feedback on students' ability to connect NBS concepts with real-world applications.		NA
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NBS- Application of Curriculum, Trends and Skills

Curriculum integration (how it may connect to curriculum)						
<u>Teaching &amp; Learning Trends employed</u>  <u>Highlight all that apply</u>  <u>(Source)</u>	<b>Project-based learning:</b> e.g., students work in groups on a research project on greenhouses and the greenhouse effect, alternatives to waste management or investigate what are the views of their peers on climate change.	<b>Peer learning:</b> e.g., students work in groups, evaluate the work of their peers, or develop assessment questions to assess peers.	<b>Problem-based Learning:</b> e.g., students are introduced to a problem and challenged to find a solution together based on the information provided to them.	<b>Student-centred learning:</b> the learning scenarios are not based on classical instruction by the teacher, but they are expected to actively engage students in the lessons.		

<p>21st Century Skills</p> <p><b><u>Highlight all that apply</u></b></p> <p>(Source)*</p>	<p><b>Creativity:</b> e.g., students think of various solutions for promoting a better lifestyle in their communities or encourage greener solutions to their schools' issues.</p>	<p><b>Information/ Media literacy:</b> students explore examples of NBS, research similar solutions in other communities.</p>	<p><b>Collaboration:</b> e.g., students work in groups and engage in task division to produce outputs.</p>	<p><b>Critical thinking:</b> e.g., students learn that a debate on deforestation or climate change does not consist of two opposing camps only but involves many stakeholders with different perspectives.</p>	<p><b>Communication:</b> e.g., students present their work to the whole class and learn to put forth strong arguments based on facts.</p>
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\*Gras-Velázquez, À., Mulvik, I. B., Campodonio, A., Nada, C. & Pocze, B. (2020) *Nature-Based Solutions in education - Validation report, European Commission, August 2020* [accessed on 25/03/2024 <https://files.eun.org/NBS/NBS-pilot-validation-report-final.pdf> ] p.8.

<p>GreenComp - European Sustainability Competency Framework</p> <p><b><u>Highlight all that apply</u></b></p> <p>(Source) 1- Embodying Sustainability Values and 2 - Embracing Complexity in Sustainability (see pp.13-14)</p>	<p><b>1.1 Valuing Sustainability:</b> To reflect on personal values; identify and explain how values vary among people and over time, while critically evaluating how they align with sustainability values</p>	<p><b>1.2 Support Fairness:</b> To support equity and justice for current and future generations and learn from previous generations for sustainability</p>	<p><b>1.3 Promoting Nature:</b> To acknowledge that humans are part of nature; and to respect the needs and rights of other species and of nature itself in order to restore and regenerate healthy and resilient ecosystems</p>	<p><b>2.1 Systems Thinking:</b> To approach a sustainability problem from all sides; to consider time, space and context in order to understand how elements interact within and between systems.</p>	<p><b>2.2 Critical Thinking:</b> To assess information and arguments, identify assumptions, challenge the status quo, and reflect on how personal, social and cultural backgrounds influence thinking and conclusions.</p>	<p><b>2.3 Problem Solving:</b> To formulate current or potential challenges as a sustainability problem in terms of difficulty, people involved, time and geographical scope, in order to identify suitable approaches to anticipating and preventing problems, and to mitigating and adapting to already existing problems</p>
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<p>GreenComp - European Sustainability Competency Framework</p> <p><b><u>Highlight all that apply</u></b></p> <p>(Source) 3- Envisioning sustainable futures and 4 - Acting for Sustainability (see pp.13-14)</p>	<p><b>3.1 Futures Literacy:</b> To envision alternative sustainable futures by imagining and developing alternative scenarios and identifying the steps needed to achieve a preferred sustainable future.</p>	<p><b>3.2 Adaptability:</b> To manage transitions and challenges in complex sustainability situations and make decisions related to the future in the face of uncertainty, ambiguity and risk. generations and learn from previous generations for sustainability</p>	<p><b>3.3 Exploratory Thinking:</b> To adopt a relational way of thinking by exploring and linking different disciplines, using creativity and experimentation with novel ideas or methods.</p>	<p><b>4.1 Political Agency:</b> To navigate the political system, identify political responsibility and accountability for unsustainable behaviour, and demand effective policies for sustainability.</p>	<p><b>4.2 Collective Action:</b> To act for change in collaboration with others.</p>	<p><b>4.3 Individual Initiative:</b> To identify own potential for sustainability and to actively contribute to improving prospects for the community and the planet</p>
<p>Author and organisation to credit when using the LU</p>	<p>Centre for Social Innovation - Trinity Business School, Trinity College Dublin</p>					

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**NBS Keywords Checklist (tick here below)**

	Forest Preservation
	Forest Restoration

<p>Teacher Resources (If 'Notes' are used in the related PowerPoint presentation please indicate here)</p>	<p>Learner Resources (e.g. academic articles or links) for advanced reading or review (citation in individual cells)</p>
	NBS

Faivre et al (2017) NBS and the

	<i>Forest enhanced management for woodfuel harvest</i>
	<i>Forest Production</i>
	<i>Grassland Preservation</i>
	<i>Grassland Restoration</i>
	<i>Grassland grazing management</i>
	<i>Coastal Preservation</i>
	<i>Coastal Restoration</i>
	<i>Coastal maintenance of slope vegetation</i>
	<i>Maintenance of coastal, floodplain and riverine vegetation</i>
	<i>Agroforestry</i>
	<i>Reduce tillage and carbon restoration practices</i>
	<i>Agricultural intensification</i>
	<i>Urban forests and green spaces</i>
	<i>Urban green roofs</i>
x	Climate-change adaptation and mitigation
x	Sustainable cities/ sustainable communities
x	Re-naturing cities/ re-naturing communities
x	Urban regeneration
x	Coastal resilience
	Multi-functional watershed management
	Enhancing the insurance value of ecosystems
	Sustainability of the use of matter and energy
x	Sustainable development
x	Innovating with nature
x	Biodiversity
x	Nature-based enterprises
x	Nature-based entrepreneurship
x	NBS and new business and investment models
x	Citizen participation, stakeholder/community consultation
x	Disaster risk reduction
	Risk management and resilience
x	NBS policy development and implementation
	NBS research
	Green infrastructure
	Green finance / sustainable finance
x	Ecosystem services and ecosystem-based approaches


x	Rural municipal/local authority/government planning	
x	Coastal municipal/local authority/government planning	
x	Urban municipal/local authority/government planning	
	Improving well-being and quality of life	
x	NBS and new business and investment models	
	NBS and CCAM (Connected, Cooperative and Automated Mobility)	
	Other 1: (Please specify)	nature-inspired innovations
	Other 2: (Please specify)	
	Other 3: (Please specify)	

Keywords Source 1: United Nations Environment Programme (2020). *The Economics of Nature-based Solutions: Current Status and Future Priorities*. United Nations Environment Programme Nairobi., p.5. (keywords above in italics)

Keywords Source 2: Faivre N, Fritz M, Freitas T, de Boissezon B, Vandewoestijne S. (2017)'Nature-Based Solutions in the EU: Innovating with nature to address social, economic and environmental challenges.' *Environ Res.* 2017 Nov;159:509-518. doi: 10.1016/j.envres.2017.08.032. Epub 2017 Sep 8. PMID: 28886502.

Keywords Source 3: European Commission (2015). *Towards an EU Research and Innovation policy agenda for Nature-Based Solutions & Re-Naturing Cities: Final Report of the Horizon 2020 Expert Group on 'Nature-Based Solutions and Re-Naturing Cities' Full Version*. Luxembourg: Publications Office.













