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 NBS					
NBS Context (e.g. urban rural, coastal)	NBS keywords **complete checklist at the end of the document**	Other Keywords (topics other than NBS) **add in Other below**	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 the future of Nature-Based Solutions (NBS), focusing on the role of innovation, emerging technologies, and policy frameworks in scaling NBS for climate resilience and urban sustainability. The session discusses the integration of smart technologies,						
LU Summary (2-3 sentences)	This unit covers the future of Nature-Based Solutions (NBS) and the role of emerging technologies such as AI, IoT, and big data in enhancing their impact. Students will explore how EU-funded projects like Horizon Europe, Connecting Nature, and LIFE Program drive innovation, and how public policy and community engagement contribute to the scaling of NBS. The session also highlights career opportunities and key skills for professionals in the NBS sector.						
Learning Outcome 1	Understand the role of innovation and emerging technologies in advancing Nature-Based Solutions (NBS).						
Learning Outcome 2	Identify EU-funded projects and policies that support the scaling of NBS in urban and rural environments.						
Learning Outcome 3	Evaluate the challenges and opportunities for scaling up NBS and the emerging job roles in the NBS sector.						
Learning Outcome 4							

LU designer resources for writing learning outcomes (click Learning Outcomes - Using Taxonomies tab or pyramid here)

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 emerging technologies and their integration into NBS to drive urban sustainability and climate resilience.	1	Overview of technologies driving NBS innovation [Slides 3-7].	Present the key technologies that are enhancing NBS, including AI, IoT sensors, data analytics, and smart grids. Discuss how these technologies are applied in smart cities, such as monitoring rain gardens, green roofs, and stormwater management systems. Explore the role of predictive analytics and real-time monitoring in improving the effectiveness of NBS.	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.

15 minutes	Discuss the future innovations in green infrastructure and ecosystem restoration using NBS.	2	Case study of innovative NBS applications [Slides 8-12].	Present case studies on living walls, modular green infrastructure, eco-friendly building materials, and coastal restoration (e.g., mangroves, wetlands). Highlight EU-funded projects like ReGREEN and Urban Greening, showing how they use green infrastructure to address flooding and climate resilience. Discuss the potential for smart conservation using data analytics and sensors to monitor and improve biodiversity in	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	Evaluate the challenges and opportunities for scaling NBS and explore career opportunities in the NBS sector.	3	SWOT analysis of scaling up NBS and career opportunities [Slides 13-16].	Lead a SWOT analysis (Strengths, Weaknesses, Opportunities, Threats) of scaling up NBS in cities, considering economic viability, public perception, and policy support. Discuss emerging job roles like Urban Sustainability Managers, Green Infrastructure Engineers, and Community Engagement Specialists. Analyze the key skills required for professionals working in the NBS sector, including expertise in GIS, IoT, data analytics, and	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 the integration of emerging technologies and the scaling of NBS. Encourage students to reflect on how NBS can drive urban resilience and climate adaptation in the future.	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

NBS- Application of Curriculum, Trends and Skills

Curriculum integration (how it may connect to curriculum)				
Teaching & Learning Trends employed **Highlight all that apply** (Source)	**Project-based learning**: 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.	**Peer learning:** e.g., students work in groups, evaluate the work of their peers, or develop assessment questions to assess peers.	**Problem-based Learning**: e.g., students are introduced to a problem and challenged to find a solution together based on the information provided to them.	**Student-centred learning:** the learning scenarios are not based on classical instruction by the teacher, but they are expected to actively engage students in the lessons.

21st Century Skills **Highlight all that apply** (Source)*	**Creativity:** e.g., students think of various solutions for promoting a better lifestyle in their communities or encourage greener solutions to their schools' issues.	**Information/ Media literacy:** students explore examples of NBS, research similar solutions in other communities.	**Collaboration:** e.g., students work in groups and engage in task division to produce outputs.	**Critical thinking:** 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.	**Communication:** e.g., students present their work to the whole class and learn to put forth strong arguments based on facts.

*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.

GreenComp - European Sustainability Competency Framework **Highlight all that apply** (Source) 1- Embodying Sustainability Values and 2 - Embracing Complexity in Sustainability (see pp.13-14)	**1.1 Valuing Sustainability:** 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	**1.2 Support Fairness:** To support equity and justice for current and future generations and learn from previous generations for sustainability	**1.3 Promoting Nature:** 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	**2.1 Systems Thinking:** 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.	**2.2 Critical Thinking:** To assess information and arguments, identify assumptions, challenge the status quo, and reflect on how personal, social and cultural backgrounds influence thinking and conclusions.	**2.3 Problem Solving:** 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

GreenComp - European Sustainability Competency Framework **Highlight all that apply** (Source) 3-Envisioning sustainable futures and 4 - Acting for Sustainabilty (see pp.13-14)	**3.1 Futures Literacy:** To envision alternative sustainable futures by imagining and developing alternative scenarios and identifying the steps needed to achieve a preferred sustainable future.	**3.2 Adaptability:** 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	**3.3 Exploratory Thinking:** To adopt a relational way of thinking by exploring and linking different disciplines, using creativity and experimentation with novel ideas or methods.	**4.1 Political Agency:** To navigate the political system, identify political responsibility and accountability for unsustainable behaviour, and demand effective policies for sustainability.	**4.2 Collective Action:** To act for change in collaboration with others.	**4.3 Individual Initiative:** To identify own potential for sustainability and to actively contribute to improving prospects for the community and the planet
Author and organisation to credit when using the LU	Centre for Social Innovation - Trinity Business School, Trinity College Dublin					

NBS Keywords Checklist (tick here below)	
	Forest Preservation
	Forest Restoration

Teacher Resources (If 'Notes' are used in the related PowerPoint presentation please indicate here)	**Learner Resources (e.g. academic articles or links) for advanced reading or review (citation in individual cells)**
	NBS
	Faivre et al (2017) NBS and the

	Forest enhanced management for woodfuel harvest
	Forest Production
	Grassland Preservation
	Grassland Restoration
	Grassland grazing management
	Coastal Preservation
x	*Coastal Restoration*
	Coastal maintenance of slope vegetation
x	*Maintenance of coastal, floodplain and riverine vegetation*
	Agroforestry
	Reduce tillage and carbon restoration practices
	Agricultural intensificiation
	Urban forests and green spaces
	Urban green roofs
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 enterpreneurship
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	
	Coastal municipal/local authority/government planning	
	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.*