

## NBS EduWORLD - Project Education Learning Unit Overview

Prepared by: Prof. Gemma Donnelly-Cox, Dr Conor Dowling, Dr Maria Gallo - Trinity Business School

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

Name of Learning Unit (LU) Topic		Seaweed Farming Case					
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 introduces seaweed farming as a Nature-Based Solution (NBS) for coastal resilience and climate change mitigation. Students will learn about EU-funded research projects exploring the environmental and economic benefits of seaweed farming. The session covers how						
LU Summary (2-3 sentences)	Seaweed farming is emerging as a promising Nature-Based Solution for coastal resilience and climate change mitigation. This unit explores the environmental and economic benefits of seaweed farming, including carbon sequestration, coastal protection, and sustainable food production. The session also highlights EU-funded projects that support the growth of the seaweed farming industry.						
Learning Outcome 1	Understand seaweed farming as a Nature-Based Solution (NBS) and its role in coastal resilience, carbon sequestration, and sustainable food production.						
Learning Outcome 2	Identify EU-funded research projects and their contributions to the development of sustainable seaweed farming in Europe.						
Learning Outcome 3	Evaluate the challenges and opportunities in scaling up seaweed farming, focusing on market demand, technical expertise, 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 seaweed farming as a Nature-Based Solution (NBS) and explain its environmental and economic benefits.	1	Overview of seaweed farming and its benefits [Slides 3-5].	Define seaweed farming and its role in carbon sequestration, coastal protection, and biodiversity enhancement. Discuss the economic value of seaweed farming, including sustainable resource production for the food, bioenergy, and pharmaceutical industries.	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 such as SEAMARK, KELP-EU, and C-FAARER, and their contributions to sustainable seaweed farming.	2	Case study on EU-funded seaweed farming projects [Slides 6-10].	Present case studies of EU-funded projects like SEAMARK, KELP-EU, and C-FAARER, focusing on their goals to improve seaweed farming through genetic innovation, sustainable business models, and community-driven solutions. Discuss how these projects contribute to carbon sequestration, sustainable food production, and the scaling of the seaweed industry in Europe.	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 challenges and opportunities in scaling up seaweed farming.	3	SWOT analysis of seaweed farming [Slides 11-14].	<p>Lead a class discussion on the challenges (e.g., regulatory hurdles, market demand, environmental conditions) and opportunities (e.g., economic potential, carbon credits, job creation) of seaweed farming.</p> <p>Use a SWOT analysis (Strengths, Weaknesses, Opportunities, Threats) to identify the barriers and benefits to scaling up seaweed farming.</p> <p>Discuss how to overcome challenges like technical expertise and market</p>	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 about seaweed farming as a Nature-Based Solution (NBS). Encourage students to reflect on how seaweed farming can contribute to sustainable economies, coastal protection, and climate mitigation.	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)	
---	--

<p><u>Teaching &amp; Learning Trends employed</u></p> <p><b>Highlight all that apply</b></p> <p>(Source)</p>	<p><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.</p>	<p><b>Peer learning:</b> e.g., students work in groups, evaluate the work of their peers, or develop assessment questions to assess peers.</p>	<p><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.</p>	<p><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>	
<p>21st Century Skills</p> <p><b>Highlight all that apply</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>

\*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 <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>
<p>GreenComp - European Sustainability Competency Framework <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>

Author and organisation to credit when using the LU	Centre for Social Innovation - Trinity Business School, Trinity College Dublin
---	--

*NB: This Learning Unit is available as part of the Creative Commons 4.0: This allows others to download this Learning Unit and share it with others as long as they credit the author/organisation, but they can't change them in any way or use them commercially.*

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

	<i>Forest Preservation</i>
	<i>Forest Restoration</i>
	<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

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



	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
	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.

















