European Commission

NATURE-BASED SOLUTIONS LEARNING SCENARIO

Green Jobs Create Economic Opportunities

Research and Innovation

Green Jobs Create Economic Opportunities

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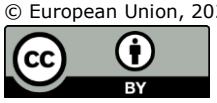

EUROPEAN COMMISSION

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Green Jobs Create Economic Opportunities

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ABSTRACT

In this lesson, students in their final year of high school will reflect on how their future jobs can be a part of the green economy, paying special attention to how they can integrate Nature-Based Solutions (NBS) and thereby influence their local economies and communities positively. After an introduction to NBS and green economy, students will focus on sustainable professions. They will examine the socio-environmental impact of their dream jobs and suggest nature-based solutions that can help to reduce this negative environmental impact. A question the students will consider is whether their preferred profession will need to disappear, change considerably, remain, or become more important due to raising environmental concerns. After choosing their future job, students will answer the previous question by categorizing their jobs based on an adaptation of the Six Thinking Hats methodology. Finally, students will reflect on their choices and elaborate a set of skills schools should teach to prepare students for a greener workforce.

Keywords

Economic Opportunities, Green Jobs, NBS, Sustainable Development, SDGs

1. Introduction

> *"Nature-based solutions (NBS) are solutions that are inspired and supported by nature, which are cost-effective, simultaneously provide environmental, social and economic benefits and help build resilience. Such solutions bring more, and more diverse, nature and natural features and processes into cities, landscapes, and seascapes, through locally adapted, resource-efficient and systemic interventions. Nature-based solutions must therefore benefit biodiversity and support the delivery of a range of ecosystem services."*
> *https://ec.europa.eu/info/research-and-innovation/research-area/environment/nature-based-solutions_en*

To use this Learning Scenario more effectively, teachers are encouraged to:

- Check out the list of recent EU publications on Nature-Based solutions
- Read about Nature-based solutions: Transforming cities, enhancing well-being (also available as a PDF)
- Contact local NBS practitioners or scientists working in their area (they can be found through Oppla).
- Use the "Ask Oppla" service to request help in case of any technical/scientific question on NBS.

2. Overview

Overview	
Subject	Earth and environmental sciences, ICT
Topic	Economic opportunities and green jobs
Age of students	17 – 19 years old
Preparation time	1 day (including 8 hours to do online, before the students, the two modules of "Introduction to green economy" course + to prepare the online material and to get the offline material).
Teaching time	8 sessions (55 minutes each) 6 sessions (55 minutes each) if lessons 3 and 4, and 7 and 8 are joined as one.

Overview	
Online teaching material	- Online course Platforms and tools: - Interactive map - To create QR codes - Interactive board, for example NoteBookCast - Six thinking hats - Collaborative wall to write, for example Padlet.
Offline teaching material	Video projector, projector screen, computers, coloured hats, paper, pens, Sellotape, mobile phones or tablets, blackboard, chalks, continuous paper, and an architect (when possible).
NBS resources used	- Oppla – the EU Repository of Nature-Based Solutions - Nature-based solutions on the European Commission website - Real examples of NBS from the Nature4cities project - Real examples of NBS from the proGlreg project - Atlas of NBS in European cities - NBS example from Spain - The 5 principles of green economy - Video on NBS in South America (in Spanish) - Video on Climate change and NBS (in Spanish)

3. Integration into the curriculum

The topic of this learning scenario – economic opportunities, and green jobs – ties in with Spanish national and regional curriculum. Within the subject "Earth and environmental sciences", the group of contents (number 7) is called "Environmental management and sustainable development". These contents aim for students to:

- Reflect on environmental problems.
- Know and appreciate the importance of achieving sustainable development.
- Develop positive attitudes towards the environment.
- Consider the environment in economic decision making.
- Think about the impact of economic growth and its effects on the quality of people's lives, the environment, and the distribution of local and worldwide wealth.

Note that this LS that can be better implemented and more successful at the start or middle of the school year, as students would have more time to reflect on their future and could develop practical activities in the school to see the benefits of NBS. Furthermore, this LS lends itself to be implemented collaboratively by a team of teachers of different subjects and/or classes, as this LS is directly linked to Earth and Environmental Sciences (e.g. Biology and Geology) because Nature-Based Solutions (NBS) depend on ecosystems and the services they provide, to respond to various problems such as climate change. The topic elaborated here, economic opportunities and green jobs, also includes the subjects of Economy and Company Basics to convince people of the environmental, social and economic benefits of carrying out NBS (Social Sciences). Students should work with information about our topic and should know how to search on official or governmental websites and media (ICT). In addition, they must use new technologies, digital devices, and online applications to carry out the proposed activities (Technology). They also need critical thinking to know how to improve the environment through their future jobs. They use creativity to think about how to adapt their future work to ecological needs using NBS. Throughout this process, they will collaborate with their colleagues and work together to achieve the best possible results, so communication is essential to learning how to convey different ideas (Philosophy and Language).

4. Aim of the lesson

By the end of the lesson, the aim is that students:

- Know what Nature-Based Solutions are.
- Realise the importance of caring for and protecting the environment.
- Understand that many jobs that contribute to the development of NBS provide an opportunity for economic and social growth.
- Make a summary about what skills should be taught in schools to think greener.
- Have a general discussion about how gender issues affect green jobs.

5. Outcome of the lesson

Students will develop an interactive and collective map of NBS activities near our town, each of them providing an example. They will also set out in a document how they see their future jobs before and after the sessions; that is, if they will be able to develop NBS in their future work.

After that, they will make a summary about what skills should be taught in schools to think greener. However, the most important outcome is that they will be aware of the need to involve all the community in the care and protection of the environment, and how this enhances economic growth.

6. Trends

The relevant trends that the lesson incorporates are:

- Collaborative Learning
- Flipped Classroom
- Game Based Learning and Gamification
- Brainstorming

7. 21st century skills

Learning skills are developed because students need the critical thinking to know how to improve the environment through their future jobs. They use *creativity* to think how to adapt their future work to green needs using nature-based solutions. Throughout this process they will *collaborate* with their colleagues and work together to achieve the best possible results, meaning *communication* is essential to learn how to transmit different ideas.

Literacy skills are also strengthened. Students should work with information about our topic and should know how to search on official or governmental websites and media (information and *media literacy*). In addition, they must use new *technologies*, digital devices, and online applications to carry out the proposed activities.

This learning scenario is linked to *life skills* too through the flexibility they should have with their ideas, being capable to recognise mistakes and learn from them. They need leadership and initiative to change the things that they do not like from the environment and require productivity to reach these goals in their future jobs. Finally, social skills are developed in every aspect, in order to make connections with people and be successful in their works and business, and to convince people of the environmental, social and economic benefits of carrying out nature-based solutions.

8. Activities

Activity	Procedure	Time
Session 1		
What are Nature-Based Solutions?	The main aim of this session is to explain the meaning of the acronym NBS and watch a couple of videos: A 3 minutes video from South America IUCN (International Union for Conservation of Nature) about NBS. A 3 minutes video from IUCN about climate change and NBS.	10 minutes

Activity	Procedure	Time
	Extra sources that can be used, if the teacher thinks it would help, but are not be obligatory: • https://www.nature-basedsolutions.com/ • https://www.tudelft.nl/myanmar/nature-based-solutions/ • https://www.womenforwater.org/wfwp-at-cop24-why-is-it-difficult-to-implement-nature-based-solutions-for-water-management.html • http://www.eklipse-mechanism.eu/apps/Eklipse_data/website/EKLIPSE_Report1-NBS_FINAL_Complete-08022017_LowRes_4Web.pdf • https://www.iucn.org/commissions/commission-ecosystem-management/cem-resources/nature-based-solutions	
Examples of NBS	Teachers and students will visit and explore together real examples of NBS, using the website of the two projects below: • Nature4cities project • proGlreg project The Atlas of NBS in European cities shows the extent of NBS in more than 100 European cities, while this NBS example from Spain is an example close to the author's school, in Toledo. Teachers from other cities/countries can find similar examples close to them in the Atlas and using the Oppla case study finder.	20 minutes
I understood what NBS is	Here students should capture with their mobile phones a QR code linking it to an interactive map (such as zeemaps). The interactive map will be created beforehand by the teacher. The High School will be identified on the map, so students can search for examples of NBS in the vicinity and mark newfound places. They should add a website and a picture of this action.	25 minutes
Session 2		
Think Nature	This session will start with an NBS online game	35 minutes
Introduction to green economy	The students will have to name the 5 principles of green economy. Homework: access this online course and go through the "Introduction to green economy" and to the following two modules: Module 4 - Devising a pathway: Strategies and planning for reaching green economy policy objectives. Module 5 - A helping environment: International frameworks and initiatives in support of inclusive green economies. These modules are estimated to take them ~ 2-3 hours.	20 minutes
Session 3		
Sustainable professions (part I)	Invite a professional who works with or knows about the possibilities of implementing NBS in their work environment. In the case of the Learning Scenario's author, an architect, Sami Chahrour, was invited to talk about how to go from grey to green infrastructure and how to make use of NBS at the workplace.	55 minutes
Session 4		
Sustainable professions (part II)	To continue with the talk of the last session. Time for students to ask questions. If possible, this session should be on the same day and following the intervention from the expert. If not possible to have two ~1-hour sessions, it is possible to make the overall session shorter.	55 minutes

Activity	Procedure	Time
Session 5		
What do you want to do when you grow up? (part I)	Students will be asked to think about what they want to do when they grow up. They must write it on a piece of paper, stick it on a coloured hat and put on the hat. They will have hats of six different colours (black, white, yellow, red, green and blue), and they must choose one of them based on the following original adaptation from "six thinking hats" by Edward de Bono: Black hat: jobs that negatively influence the environment. White hat: jobs that have no influence on the environment and remain the same regardless of environmental concerns. Yellow hat: jobs that can integrate a green philosophy. Red hat: jobs that tend to be replaced by others as concerns for the environment are increasing, which may generate negative feelings among young people, especially if the jobs that they might be interested in are likely to disappear. Green hat: new jobs that appear due to concern for the environment. Blue hat: teacher's hat. This hat organises the information that it receives from the previous five hats. Students will visit NoteBookCast where they will find an interactive board created beforehand by the teacher. This board is divided into six spaces that correspond to the six-coloured hats. Each student writes their name and job in the coloured hat space that they had chosen. After that, students will discuss why they have chosen their coloured hat in groups of 3-4 people. They will have to decide if this choice has been a good fit in line with the selected job and its potential to include NBS. The table in Annex 1 may help with the discussion on NS jobs opportunities.	55 minutes
Session 6		
What do you want to do when you grow up? (part II)	All of them will explain to the others their reflections of the last class and, if necessary, they will change their hats. Finally, they return to NoteBookCast to change (or not) the position of their name and job. The teacher will write in the blue hat space on the interactive board the reasons of the changing (if any) and the conclusions of this session.	55 minutes
Session 7		
21st century green skills	Thank the students on their last session reflections. In this session the students will make a summary about what skills should be taught in schools to think greener. (1) They will work in pairs of 2 (10 minutes). (2) They will work in groups of 3-4 people (10 minutes). (3) They will explain their ideas to the whole group.	55 minutes
Session 8		
Green skills on the wall	On Padlet, students will create a document about the 21st century green skills of the last class.	55 minutes

9. Assessment

I have evaluated my students' understanding of NBS during the learning scenario using the NBS online game and through the interactive map students filled during the classes.

10. Student feedback

My students had no problems working online as this is how we are currently doing due to the situation we are experiencing in the midst of the coronavirus crisis.

My students gave me feedback and they have discussed the lessons following a questionnaire designed for this purpose (see Annex 2).

The most important conclusions were:

- Most students did not know what Nature-Based Solutions were before I used this learning scenario.
- The activities they liked the most were the talk about sustainable architecture, the dynamic of the hats, the interactive map and the NBS game.
- All the students think that the contents have been presented in an interactive and attractive way, and their participation has been favoured.
- Most students believe that everyone should know about NBS and what they have learned from this experience is useful.
- 80% think they could implement a Nature-Based Solution in their future jobs.
- The students consider that the most useful thing they have learned is that we can all contribute to taking care of the environment.
- To further enhance their learning experience, they propose inviting more experts on the subject to learn more about NBS initiatives first-hand.
- None of them has had trouble understanding the lesson, but a couple of them have had difficulties doing the activities due to problems with their internet connection.

My students now know what Nature-Based Solutions are and understand them. They have realised the importance of caring for and protecting the environment and believe that every job can help in the development of NBS and this can also be an opportunity for economic and social growth. They have started to think greener than before. However, the most important thing I have achieved with my students it is that they are aware of the need to involve the entire community in the process of developing NBS and caring and protecting the environment.

11. Teacher's remarks

This project has been very interesting to me from the beginning and, as I have seen, also to my students. The general balance after implementing this learning scenario has been quite positive, as the attached self-assessment questionnaire shows. Furthermore, the contributions of the experts have considerably enriched the unit, and this has been declared by the students too.

		SELF-ASSESSMENT				
GRADE (from 1=Little to 5= A lot)		1	2	3	4	5
The objectives are consistent with the learning scenario proposed.						X
ACHIEVEMENT OF OBJECTIVES	They know what nature-based solutions are.					X
	They have realised the importance of caring for and protecting the environment.					X
	They understand that each job can help in the development of NBS and this can also be an opportunity for economic and social growth.					X
	They have outlined the skills to be taught in schools to think greener.					X

		SELF-ASSESSMENT				
GRADE (from 1=Little to 5= A lot)		1	2	3	4	5
CONTENTS	The contents are consistent for the development of skills					X
	The presentation of content is done in a motivating way.					X
	The learning scenario is integrated into the curriculum of the subject.					X
ACTIVITIES	Activities promote the achievement of objectives.					X
	Activities follow a logical sequence.					X
	Activities encourage the active participation of students.					X
	The participation of student has been high.					X
RESOURCES AND TIMES	Material resources have been appropriate.				X	
	Online resources have been appropriate.				X	
	The times envisioned for which activity were sufficient.		X			
Feedback indicators for students are adequate.						X
General satisfaction with this learning scenario.					X	

This learning scenario has been carried out in online sessions through the Zoom application that students have downloaded from https://zoom.us/download, either on their computers or on their mobile phones. However, this can be done in the school online platform, or other online meeting tools with equal success.

In the first session, I explained the meaning of the NBS acronym to them and we watched a couple of videos about it. After that, we have created an interactive map with NBS examples near us (https://www.zeemaps.com/map?group=3735579).

In the second session I checked through http://game.thinknature.eu/ if the students had understood what NBS are. Later, I explained the five principles of green economy present at https://www.greeneconomycoalition.org/newsanalysis/the-5-principles-of-green-economy. Finally, I showed them how to join to "Introduction to Green Economy" course at https://unccelearn.org/ and explained that they had to do online modules 4 and 5.

In the third and fourth sessions an architect, Sami Chahrour, gave us a very interesting talk on sustainable architecture.

In the fifth and sixth sessions students reflected on how their future jobs can accomplish NBS thanks to an original adaptation from "6 thinking hats" by Edward de Bono (https://www.notebookcast.com/es/board/showboard/j4vcl3gsf/).

In the last sessions, fifth and sixth, students have reflected on the skills that must be taught in schools to think greener and have created a document (https://padlet.com/dptonat_abym/7hgsjymjfq2l02hq).

Thanks to this experience, I have also learned what Nature-Based Solutions are. I knew the strategies, but I did not know that there was a worldwide movement to make cities better places to live, while taking care of and enjoying the environment. It is very gratifying to teach students something that they do not know and that I consider very important for the future that awaits us. It is equally gratifying to see that students also consider that the use of NBS is essential in stopping climate change, and that they consider it necessary to know this vision for our development. In addition, using NBS resources seems very enriching for everyone, as there are different types and it helps you

to focus the contents in a more attractive, fun and interactive way. I would recommend to all my teacher colleagues to use NBS in their classes, enriching the content and opening the minds of the students to think in a greener way and in a position to make the world a better place.

Having to carry out the activities online has not decisively interfered in the development of the activities and they have been adapted to the teaching circumstances that we are experiencing. But on the other hand, when I planned the learning scenario, I have been quite optimistic with the distribution of the times and I have come up short in some sessions. It was not a real problem because being online classes, the students had no trouble staying connected. However, if this had happened in a normal class lasting 55 minutes, the duration of this learning scenario would have been 8 sessions; or 6 sessions (as it has been this time), but I would have had to ask my teacher colleagues for time for their classes.

To enhance the learning scenario, it could include visiting more subject matter experts to learn more about NBS initiatives first-hand, as indicated by the students. In addition, we are in the construction of an ecological and home automation greenhouse in the High School, so that in subsequent years students can establish an economic system of self-financing through the cultivation and sale of horticultural products or ornamental plants. I have not proposed it this year, as a learning scenario activity because the structure has not yet been completed, the completion of which is scheduled for next May (now we do not know when…).

Annex 1: NBS job opportunities

NBS job opportunities[1]

Enterprises that directly or indirectly deliver NBS are often 'for profit' or 'not-for-profit'. The table below shows the relationship between NBS and nature-based enterprises. It gives examples of nature-based enterprises that deliver different types of NBS directly or indirectly.

A Nature-Based Enterprise is: 'an enterprise using nature directly as a core element of their product/service offering or indirectly by contributing to the planning, delivery or operation of a nature-based solution'

NBS → / NBEs ↓	Type 1 Better use of natural/protected ecosystems E.g. coastal mangrove	Type 2 NBS for sustainable managed ecosystems E.g. natural urban forest, parks or gardens	Type 3 Design and management of new ecosystems E.g. engineered green walls/roofs/water management
Direct use of nature: **NBEs often involved in implementation of NBS**	Example: Nature Conservation NGO (non-profit) Natuurpunt (BE)	Example: Constructed wetlands company (for profit) FH Wetlands Systems Ltd. (IE)	Example: Horticulture company delivering green living rooms (for profit) Helix Pflanzen GmbH (DE)
Indirect use of nature: **NBEs often involved in planning, advisory, management, monitoring etc**	Example: Data company that monitors natural forests (for profit) GreenCityWatch (NL)	Example: Community interest company managing urban parks / gardens (non-profit) Barking Riverside CIC (UK)	Example: Environmental NGO advising on community engagement in green space redesign (non-profit) Greenspace Scotland (UK)

[1] Nature-based Enterprise Survey. Downloaded 25.05.2020 from https://connectingnature.eu/nature-based-enterprise-survey

Annex 2: Feedback form for students

1. Did you know what Nature-Based Solutions were before this lesson?

☐ Yes ☐ No

2. Do you think you now know what they are? Rate from 1 (I have no idea) to 5 (I know perfectly)

3. Rate the following activities from 1 to 5, depending on whether you found them very interesting (5) or not at all interesting (1)

☐ NBS introduction videos

☐ Interactive map

☐ NBS game

☐ Introduction to Green Economy Course

☐ Talk about sustainable architecture

☐ Dynamic of the 6 thinking hats

☐ 21st century green skills

4. Have the contents been presented in an attractive and interactive way? Rate from 1 (Absolutely not) to 5 (Yes, of course)

5. Has student participation been favoured dynamically? Rate from 1 (Absolutely not) to 5 (Yes, of course)

6. Do you think that everyone should know about these initiatives? Rate from 1 (Absolutely not) to 5 (Yes, of course)

7. Do you think what you have learned from this experience is useful? Rate from 1 (Not useful) to 5 (Very useful)

8. Do you think you could implement a Nature-Based Solution in the future from your work? Rate from 1 (Unlikely) to 5 (Very likely)

9. What is the most useful thing you have learned?

10. What could be done to improve this lesson for following years?

11. Have you had trouble understanding the lesson? If yes, please indicate which ones.

12. Have you come across difficulties when carrying out the activities? If yes, please indicate which ones.

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About the NBS project

The NBS project is initiated and funded by the European Commission Directorate-General for Research and Innovation and coordinated by PPMI, in collaboration with European Schoolnet (EUN). PPMI (www.ppmi.lt/en) is a leading European research and policy analysis centre, aiming to help public sector and civil society leaders from around the world, presenting evidence in a way that is simple, clear and ready to use. European Schoolnet (www.eun.org) is the network of 34 European Ministries of Education, based in Brussels. EUN aims to bring innovation in teaching and learning to its key stakeholders: Ministries of Education, schools, teachers, researchers, and industry partners. Find out more about nature-based solutions: https://ec.europa.eu/research/environment/index.cfm?pg=nbs and all the NBS Learning Scenarios created in this project as well as the overall reports can be found at http://www.scientix.eu/pilots/nbs-project

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In this lesson, students in their final year of high school will reflect on how their future jobs can be a part of the green economy, paying special attention to how they can integrate Nature-Based Solutions (NBS) and thereby influence their local economies and communities positively. After an introduction to NBS and green economy, students will focus on sustainable professions. They will examine the socio-environmental impact of their dream jobs and suggest nature-based solutions that can help to reduce this negative environmental impact. A question the students will consider is whether their preferred profession will need to disappear, change considerably, remain, or become more important due to raising environmental concerns. After choosing their future job, students will answer the previous question by categorizing their jobs based on an adaptation of the Six Thinking Hats methodology. Finally, students will reflect on their choices and elaborate a set of skills schools should teach to prepare students for a greener workforce.

Studies and reports

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