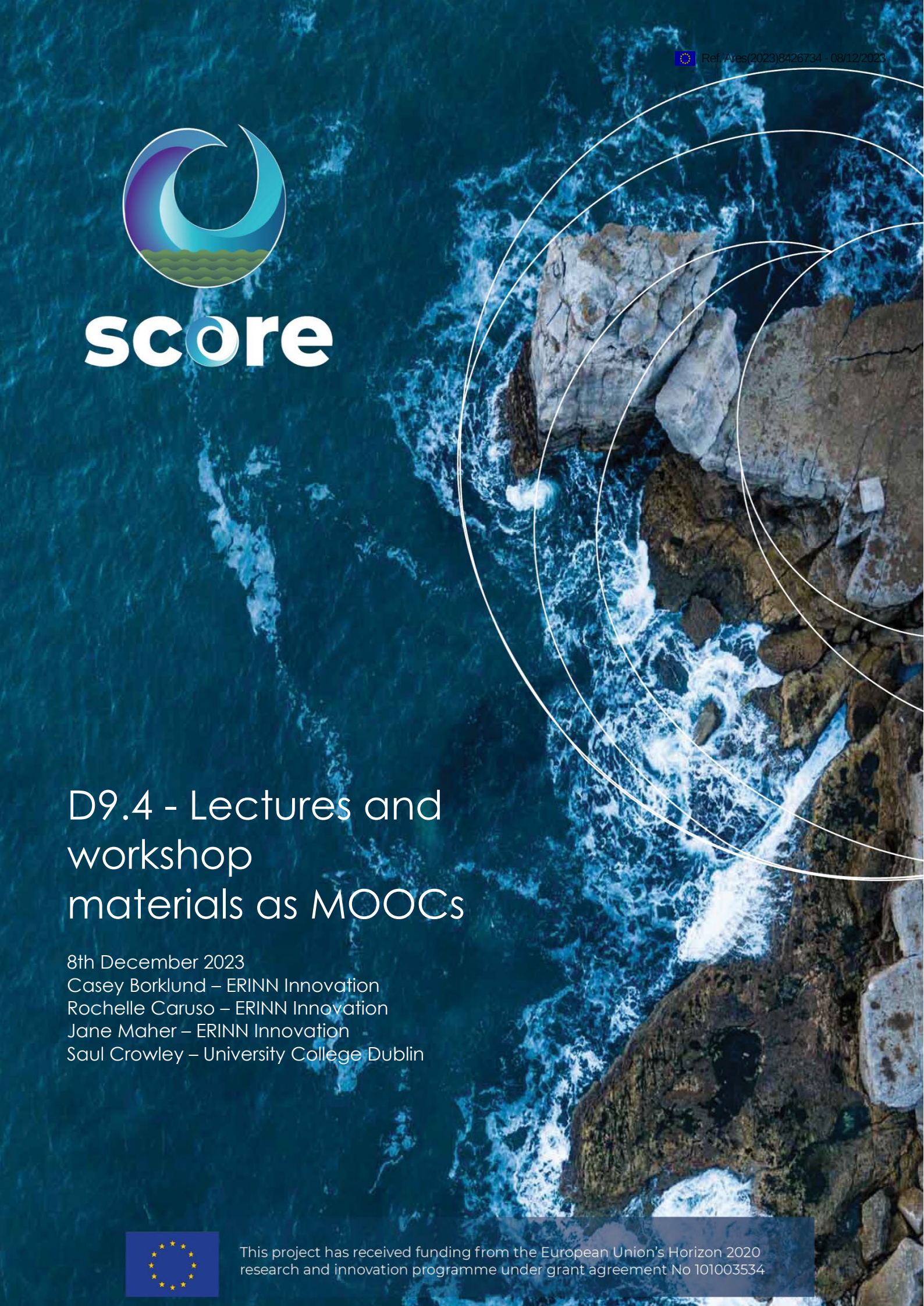

score

D9.4 - Lectures and workshop materials as MOOCs

8th December 2023

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LIST OF ACRONYMS AND ABBREVIATIONS

Acronym / Abbreviation	Meaning / Full text
CCLL	Coastal City Living Lab
EBA	Ecosystem-Based Approach
KO	Knowledge Output
KTP	Knowledge Transfer Plan
MOOC	Massive Open Online Course
NBS	Nature Based Solution
PEDR	Plan for the Exploitation and Dissemination of Results
SME	Small and Medium Enterprises
WPs	Work Packages

BACKGROUND: ABOUT THE SCORE PROJECT

SCORE is a four-year EU-funded project aiming to increase climate resilience in European coastal cities.

The intensification of extreme weather events, coastal erosion and sea-level rise are major challenges to be urgently addressed by European coastal cities. The science behind these disruptive phenomena is complex, and advancing climate resilience requires progress in data acquisition, forecasting, and understanding of the potential risks and impacts for real-scenario interventions. The Ecosystem-Based Approach (EBA) supported by smart technologies has potential to increase climate resilience of European coastal cities; however, it is not yet adequately understood and coordinated at European level.

SCORE outlines a co-creation strategy, developed via a network of 10 coastal city 'living labs' (CCLLs), to rapidly, equitably and sustainably enhance coastal city climate resilience through EBAs and sophisticated digital technologies.

The 10 coastal city living labs involved in the project are: Sligo and Dublin, Ireland; Barcelona/Vilanova i la Geltrú, Benidorm and Basque Country, Spain; Oeiras, Portugal; Massa, Italy; Koper, Slovenia; Gdansk, Poland; Samsun, Turkey.

SCORE will establish an integrated coastal zone management framework for strengthening EBA and smart coastal city policies, creating European leadership in coastal city climate change adaptation in line with The Paris Agreement. It will provide innovative platforms to empower stakeholders' deployment of EBAs to increase climate resilience, business opportunities and financial sustainability of coastal cities.

The SCORE interdisciplinary team consists of 28 world-leading organisations from academia, local authorities, and Small and medium-sized enterprises (SMEs) encompassing a wide range of skills including environmental science and policy, climate modelling, citizen and social science, data management, coastal management and engineering, security and technological aspects of smart sensing research.

EXECUTIVE SUMMARY

This document is a deliverable of the SCORE project, funded under the European Union's Horizon 2020 research and innovation programme under grant agreement No 101003534. The aim of this document is to provide a comprehensive overview of the processes of the development, implementation and execution of the SCORE Massive Open Online Courses (MOOCs) as a part of Task 9.6.3 - *Lectures and Materials as MOOCs*. Within this Deliverable 9.4, we include the learning goals, the methodological process of developing the MOOCs, detail the current live courses available, and finally lay out the plans for further development and the dissemination plan for the MOOCs.

LINKS WITH OTHER PROJECT ACTIVITIES

Task 9.6.3 and the development of the MOOCs are directly related to a number of work packages (WPs) and deliverables within SCORE. As the MOOCs are an opportunity to share and disseminate the results of the project, the vast majority of the work packages can contribute to the development of content for MOOCs.

With that being said, the main priority work packages are WP2, WP4 and WP7 due to their direct linkages to stakeholders and external SCORE personnel. As MOOCs are a live resource, there will be further opportunities to link in with additional work packages throughout the lifetime of the project. The current live courses highlight many activities and objectives within the following work packages:

- WP2: The design, implementation, and evaluation of Coastal City Living Labs.
- WP4: Citizen science activities and the SCORE low-cost sensor catalogue.
- WP6: Strategies to increase financial resilience of coastal cities.
- WP7: Socio-economic assessment of adaptation strategies and policy recommendations.
- WP8: The value of the Digital Twin and benefits of utilising technology in EBA implementation and community engagement.
- WP9: The EBA Training schools.

Overall, the MOOCs are a key element in highlighting project outputs from multiple work packages, and as such will be strongly linked to multiple project activities.

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1. INTRODUCTION

At the heart of the SCORE project is the focus on building resilience to climate change within coastal communities through the empowerment of stakeholders. This empowerment is predicated on the use of creating locally embedded solutions featuring Ecosystem-Based Approaches (EBAs), smart technologies, and financial sustainability.

The integration of solutions to climate-change related challenges within the SCORE project rely on two major concepts: Ecosystem-Based Approaches (EBAs) and Nature-Based Solutions (NBS). EBAs refer to an integrative approach combining biodiversity and ecosystem services within climate change adaptation planning to promote urban capacities to adapt to climate change[2]. EBAs are categorised under the umbrella term of Nature-Based Solutions (NBS) which refer to actions that protect, sustainably manage, or restore natural or modified ecosystems, whilst simultaneously addressing societal challenges and providing human well-being and biodiversity benefits[3]. NBS, and EBAs by extension, require stakeholder engagement to be successfully integrated into communities. With the aim of integrating multiple solutions to empower stakeholders in coastal communities to build resilience, SCORE proposes an innovative approach known as living labs, specifically, Coastal City Living Labs (CCLLs) to address climate-related challenges affecting coastal cities in Europe.

A CCLL is a novel concept to protect coastal cities from increasing climate and sea level risks, including coastal flooding and erosion, with an aim to enhance their overall long-term resilience. The EU coastline is 68,000 km long with nearly half of the EU's population living within 50 km of the sea, the majority of which is densely populated urban areas[1]. Consequently, there is a substantial potential for the use of SCORE's Coastal City Living Lab (CCLL) concept and more broadly, EBAs and smart technologies for climate resilience across Europe. Our aim is to capitalise on this potential by building and implementing Massive Open Online Courses (MOOCs), through which SCORE's CCLLs can maximise their stakeholder learning and engagement, whilst allowing other coastal communities or interested parties to easily learn about SCORE's approach, theory, and insights.

A MOOC is an open-online course for which participants from around the world can learn about a specific topic, utilising a variety of mediums, including videos, user forums, quizzes, reading materials, links to external supplementary materials and much more. MOOCs provide an affordable and flexible way to learn new skills and deliver quality educational experiences at scale. Participants require only a smart phone/tablet/computer and access to the internet – making these open-source courses an equitable opportunity for self-guided learning. The utilisation of the SCORE MOOCs will enable the project to reach a wider audience and provide valuable climate action skills/learnings to citizens in Europe and worldwide.

With SCORE's focus on locally co-developed solutions, SCORE MOOCs are a natural extension of the project's concept, allowing interested learners to equip themselves with the knowledge needed to build a more climate resilient coastal community.

This deliverable document will provide as an overview of the creation, implementation, and development of SCORE MOOCs. It provides an overview of the overall learning goals of the MOOCs, the platform selection, and course development methodology. Further, it will highlight the key elements of the two current live courses and give insight into how future courses will be developed throughout the project, and the overall planned dissemination strategy.

[1]European Environment Agency – Europe's Seas and Coast (2020) : https://www.eea.europa.eu/themes/water/europes-seas-and-coasts
[2]Adapted from the Secretariat of the Convention on Biological Diversity, 2009.
[3]Cohen-Shacham, E., Walters, G., Janzen, C., Maginnis, S., 2016. Nature-based solutions to address global societal challenges. IUCN, Gland. Switz. 97.

To visit the *SCORE Online Learning* platform, which is the platform that hosts all live MOOCs, go to https://score.thinkific.com/.

2. LEARNING GOALS & TARGET USERS

As with any learning and engagement tool, it is essential that the materials are designed and built to answer specific learning objectives and to target specific users. The below learning objectives serve as a roadmap for the MOOC Development Team (ERINN & UCD) to ensure the various MOOC courses and their respective content aligns with the intended outcomes and meets the needs of the target audience. This customisation fosters the ability for the platform to reach wider audiences and achieve multiple learning targets. Each of SCORE's courses will work to achieve several of the following learning goals, with the holistic catalogue of SCORE courses covering all of the below elements:

1) Increase knowledge of the CCLL concept and its functions.
2) Increase knowledge of the usefulness and effectiveness of Nature-Based Solutions and Ecosystem-Based Approaches for coastal cities.
3) Foster the utilisation and understanding of citizen science in climate change education.
4) Cultivate an appreciation for how digital and green solutions can be used in tandem to tackle climate change.
5) Raise awareness of the impact that the SCORE approach can have on local communities.

In developing each course, the key stakeholders' needs are considered to ensure that the modules created are tailored more appropriately to the intended audience. A well-tailored MOOC enhances the learning experience, increasing the likelihood of knowledge retention and successful application of the acquired skills or knowledge in the stakeholders' professional or personal contexts. This in turn allows courses to maximise both generated interest and overall impact. The MOOC Development Team identified the following target users for the SCORE MOOCs:

1) **SCORE CCLL stakeholders:** The local CCLL stakeholders may experience a learning curve when first engaging with the SCORE project and the CCLLs. The SCORE MOOCs can serve as a tool to empower stakeholders by providing supplementary background information on what SCORE is doing and why. By fostering this additional engagement with SCORE and the CCLL, the MOOC can encourage local stakeholders to continue engaging with the SCORE approach beyond the project's end date.
2) **Living Labs in other EU-funded projects**: Building competencies with the terminology and framework used in establishing a living lab takes a significant amount of time for stakeholders unfamiliar with the process. External EU projects establishing living labs and EBA/NBS could use these resources to allow their respective stakeholders the opportunity to learn about these concepts in the early stages of the project, thereby fostering a more productive living lab engagement process.
3) **Local municipalities, including public servants and practitioners:** For local communities with a particular interest in increasing their resilience to climate change, the MOOCs can provide practitioners and policy makers an opportunity to understand how SCORE approaches can be applied within their context, the materials and skillsets needed to implement, and the opportunities for change when applied. Notably, the introductory courses can provide a simple, accessible way to gain the scientific and methodological background necessary to understand the proposed climate and community-based solutions.

4) **Students & Teachers:** SCORE MOOCs will provide secondary and post-secondary students the opportunity to educate themselves on topics such as Nature-Based Solutions, co-creation and co-design, the development of living labs, and the role of technology in community engagement. The MOOC will achieve this by using both theoretical descriptions and practical examples to provide a comprehensive understanding of key concepts, while highlighting the work done through the SCORE project. SCORE MOOCs are a unique way for a student to engage more creatively with scientific content, making the courses a great addition for any teacher to add to their curriculum as primary or supplementary material.

5) **Citizens/General Public:** For anyone interested in the SCORE approach, specifically Nature-Based Solutions, citizen science and climate change, the MOOCs provide them with an introduction to these concepts, and if interested, more challenging modules to upskill in these areas.

Throughout the development of any SCORE MOOC, target users will be assessed by the MOOC Development Team, and course materials will be tailored to their background knowledge and learning goals. At least one MOOC will be designed to be appropriate for each of the above identified target groups.

3. DEVELOPING THE MOOC

In establishing the *SCORE Online Learning* platform, careful considerations led to the selection of Thinkific as the preferred platform on which to host the SCORE MOOCs. Chosen for its user-friendly interface, multimedia capabilities, customizability, and community engagement features, Thinkific serves as a hub for knowledge dissemination. The course material itself draws insights from a variety of SCORE materials, notably the EBA Training Schools, SCORE deliverables, Knowledge Outputs, partner contributions, and the webinar series. In this chapter, we outline the above decisions and processes in further detail to highlight the robust strategy in place for the development of SCORE MOOCs. Such a strategy provides the MOOC Development Team a clear standard to adhere to, thus ensuring ensure consistency among courses on the platform.

3.1 Selecting & Testing a Platform

A number of online learning providers/software were considered for the SCORE MOOC platform. Our priority was to select a platform that could (i) offer a simple backend to allow the T9.6 team (UCD and ERINN), to set up multiple courses, (ii) host multimedia content and learner quizzes, (iii) have flexibility to provide customisable structured modules by topic, and (iv) provide community hubs for CCLLs to directly engage with their stakeholders.

From this, the Thinkific platform was selected for both for its software functionalities and cost effectiveness. Thinkific utilises a simple drag-and-drop building to create sleek online courses, which utilise a variety of learning tools (i.e., videos, text, quizzes, live lessons, etc.), while also hosting community pages that allow MOOC users to interact with each other and their SCORE team. Additionally, it allows us to enrol an unlimited number of learners and create an unlimited number of courses, create assignments and certificates, and use a custom domain.

Users can visit the *SCORE Online Learning* MOOC platform on Thinkific at the following domain: https://score.thinkific.com/. On this site, users can create a free account, which will allow them to access all available SCORE MOOCs and communities developed for the SCORE platform.

3.2 Platform Branding

To increase user experience and create a recognisable resource, the MOOC Development Team invested in appropriately designing the branding on the SCORE Thinkific site. To start, the platform was named as the *SCORE Online Learning* platform (Figure 1), and the site was then customised to foster a strong SCORE brand identity in line with the overall project branding. This has further allowed for the platform to link in more effectively with other project outputs. See Figure 2 and Figure 3 below for the materials displayed on the main home page and curriculum page for *Course 1: What are Nature-Based Solutions*?

Figure 1. Logo for the SCORE Online Learning platform, where all courses are hosted.

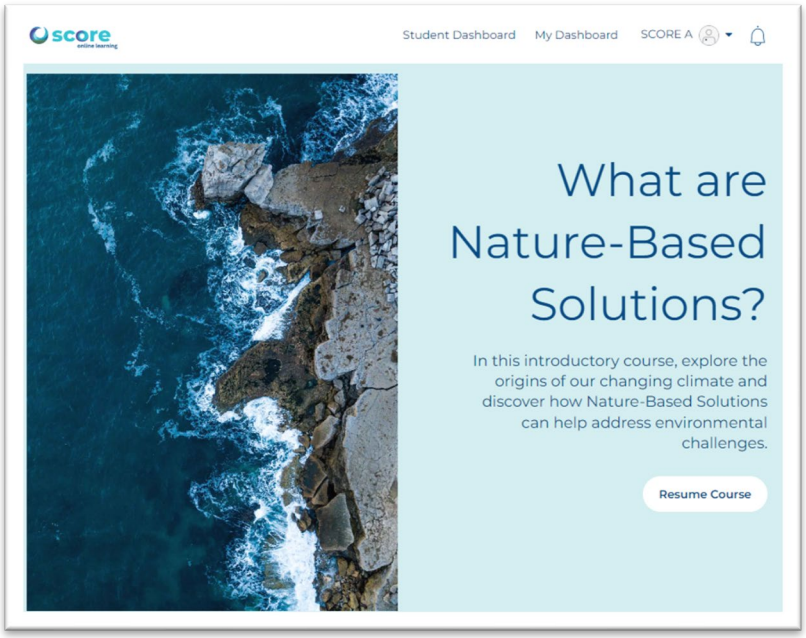

Figure 2. Home page for Course 1 – What are Nature-Based Solutions?

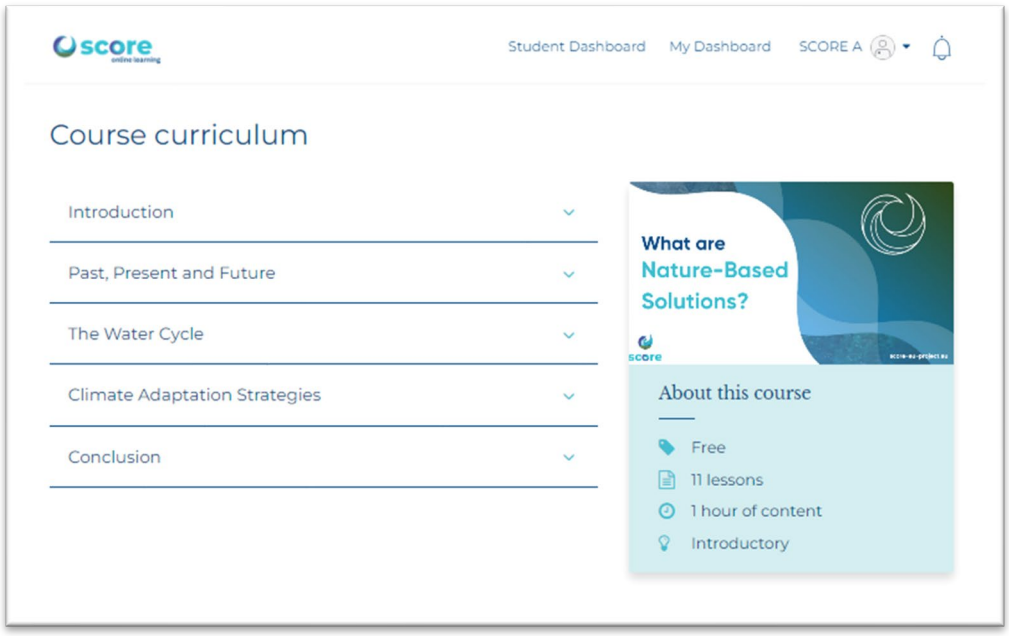

Figure 3. Course curriculum on home page for Course 1 – What are Nature-Based Solutions?

Additionally, to ensure consistency, promotional material for each course is developed by WP9 for widespread promotion of the MOOC, which keeps project branding consistent across SCORE and the modules (see Chapter 6 on the MOOC dissemination strategy).

3.3 Gathering Source Material for MOOCs

The material used to develop the SCORE MOOCs comes from a variety of sources. As such, a number of partners across work packages are involved in facilitating the development of the *SCORE Online Learning* courses either directly or indirectly. There are three main activities and resources utilised to develop modules:

1) EBA Training Schools: Notably, the MOOCs are developed in conjunction with SCORE's yearly EBA Training Schools to provide attendees with necessary background, resources, and links to participate in the activities. To see how opportunities for gamification will be utilised in upcoming MOOCs in conjunction with the EBA Training Schools, see Chapter 3.4.2 for further details. Additionally, webinars run during the EBA Training Schools will be incorporated into relevant MOOCs. For example, lecture webinars from the Year 1 EBA Training School have been incorporated into Course 2 – *Ecosystem-Based Approaches: Introduction to Implementation*.

2) SCORE Deliverables & related materials: The MOOC Development Team continually assesses SCORE deliverables, activities, research, and communication outputs to identify content that achieves the key learning objectives (See Chapter 2). Such work will be ongoing throughout the project and is the responsibility of the MOOC Development Team to facilitate this process. SCORE partners are be encouraged to submit content for incorporation into potential MOOCs, allowing partners to be active participants in the MOOC development and fill knowledge gaps identified through their work. To support this process, partners are asked to complete the MOOC Content Submission Form (Annex I), which is followed by collaborative feedback sessions to refine content. See Chapter 3.5 for further details on this validation and amendment process.

3) **SCORE Webinars:** Utilising SCORE's ongoing webinar series, these webinars/videos are incorporated as content into MOOC modules. To ensure the transition from webinar to MOOC as seamlessly as possible, the MOOC Development Team have created a "Webinar to MOOC Guidance document" (Annex II) for partners to utilise while preparing their webinars.

To see how SCORE content has been integrated into modules within the two live MOOCs, please see Chapter 5.1. This illustrates how various SCORE materials contribute to existing courses.

Please note: The content development for the MOOC is strongly linked with Knowledge Management activities undertaken in Task 9.3. For a detailed outline of this process, please see Deliverable 9.1 – *Plan for exploitation and dissemination of the project results* (PEDR). Overall, the Knowledge Management process focuses on reaching identified end-users to ensure impact and uptake of the results. MOOC modules can function to highlight the project's Knowledge Outputs and Key Exploitable Results and will be considered when developing SCORE's Knowledge Transfer Plans (KTP). A KTP is an analysed stepwise plan for achieving the identified eventual impact of any piece of knowledge, regardless of whether this impact is achievable in the short, medium, or long term and identifies the end-user capable of producing the desired eventual impact. Further, a KTP outlines a specific series of transfer activities to intermediate target users that provide a feasible plan to reach them. MOOCs can be utilised as an activity within KTPs, and this consideration will be managed by both ERINN and the Innovation Board.

3.4. Course Set Up

3.4.1 Content Requirements / Structure

On the *SCORE Online Learning* platform, the courses are structured so that within each course there are several modules, and within those modules there are lessons. Each course has a major overarching theme, such as understanding Nature-Based Solutions, or how to Implement Ecosystem-Based Approaches. Simultaneously, the modules within the course have a specific set of learning objectives that are then achieved through the lessons of text, videos, and knowledge checks.

A key benefit of the *SCORE Online Learning* platform is the ability to create MOOCs with a variety of features catered to different audiences, learning objectives, and user proficiencies. This flexibility is useful in reaching wider audiences: however, to ensure consistency in curriculum and pedagogy, there are a number of standard requirements for each course to ensure consistency:

- Each course will include a course image and course description, ensuring learners are informed about the learning topics before engaging.
- Each course will begin with a brief tutorial outlining how the lessons of the course are structured, evaluation requirements and information on how to navigate the course.
- Each lesson includes a discussion page for which participants can post questions or comments, allowing for interaction amongst participants and between instructors and participants. These discussions will be moderated and periodically monitored by the *SCORE Online Learning* platform instructors (ERINN and UCD).
- Each lesson will have compulsory completion settings, meaning that participants will be required to complete the lessons sequentially before proceeding to the next lesson or module.
- Each module will contain a knowledge check, which is an evaluation/assessment activity with quiz questions. Knowledge checks require a 60% passing grade to move to the next lesson or module. When a learner

submits an answer to a quiz question, they are then provided with an explanation of the answer. If a learner selects incorrectly, they will be able to see the explanation to correct their misunderstanding, as seen in Figure 4. These quizzes can be retaken within the module if necessary. Learners are provided feedback to their answers to each question in the knowledge check, allowing for users to further improve or clarify their understanding before proceeding to further modules.

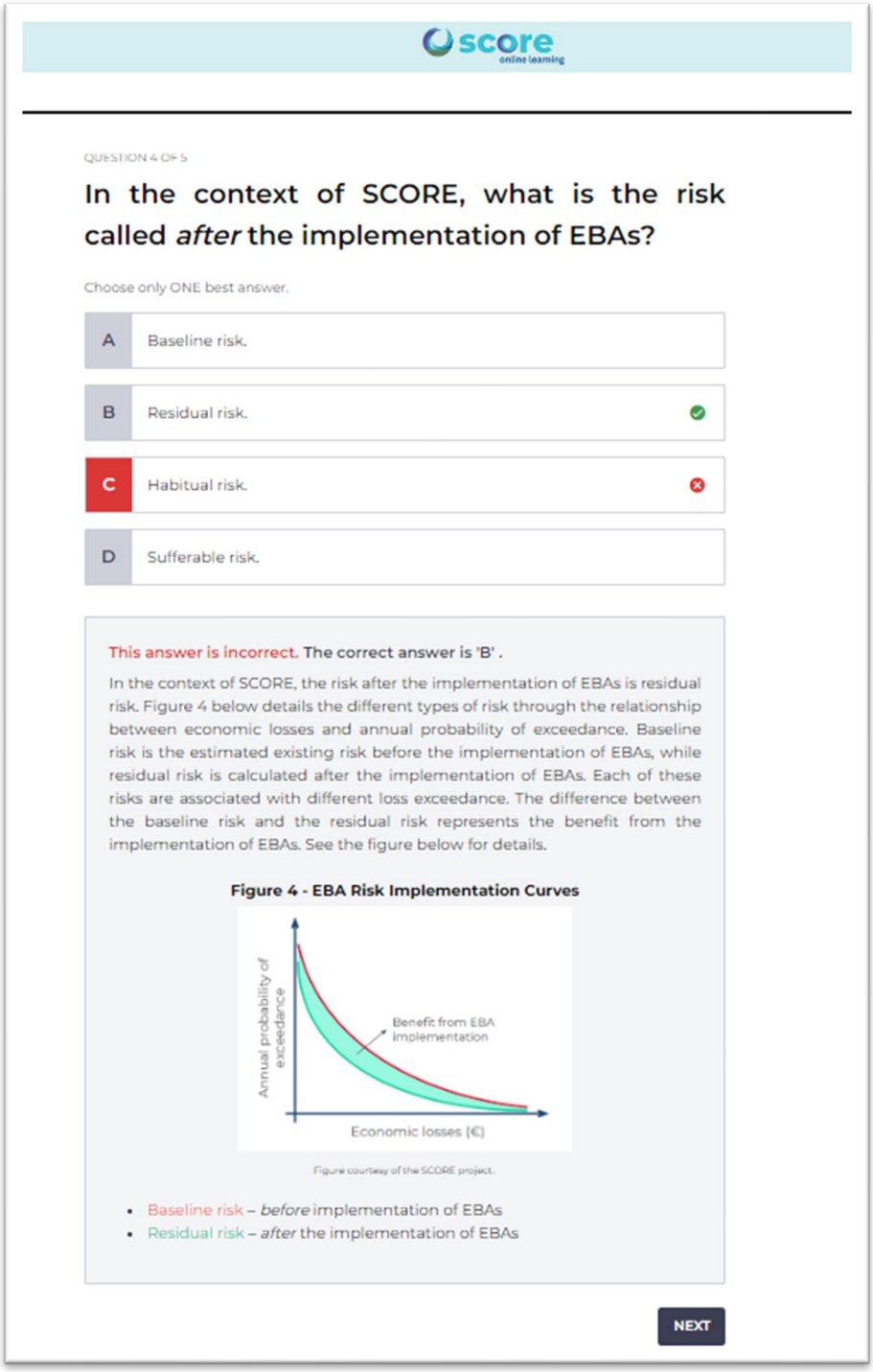

Figure 4. Knowledge Check question example from Course 2 - Ecosystem-Based Approaches: Introduction to Implementation

3.4.2 Gamification

Wherever possible, the MOOCs will utilise interactive activities. The modules developed alongside the EBA Training School will have a particular focus on including gaming simulation activities into the MOOC. These elements will be developed in accordance with Task 9.6.2.

Our approach utilises a simulation-based game that immerses players in a virtual environment to explore climate change mitigation and adaptation strategies in their own cities. This game fosters learning and understanding of diverse values, beliefs, and intentions through an interactive online platform. Players are assigned roles such as Developer, Politician, Young Person, or Environmentalist, etc. with a role description that explains their motivations to guide their decisions and interactions within the game. Through simulation and negotiation, players engage in urban design and climate adaptation activities, developing solutions that are specific to the local area to tackle climate change challenges. Evaluation and scoring encourage players to consider diverse perspectives and promote constructive dialogue. The game is designed to be localised for each CCLL, allowing players to make decisions for their own areas and draw upon their local knowledge in addition to the resources available on the MOOC platform.

By incorporating local contexts and challenges, it is our aim to foster a deeper understanding of climate change and its impacts on specific communities, empowering citizens and decision makers to develop tailored solutions for their cities based on the learning materials we have provided. The game is suitable for educational, training, advocacy, and awareness-raising purposes, enabling players to experience different viewpoints and engage in meaningful decision-making. The gamification components will be incorporated into the *SCORE Online Learning* Platform as part of SCORE's EBA Training School Year 2 (2024).

3.4.3 Participant Requirements

The SCORE MOOCs are free and easily accessible through the *SCORE Online Learning* platform, and fortunately the participant requirements are minimal. Interested learners simply require access to a smart phone/tablet/computer and an internet connection to participate. Further, there are no minimum education requirements, but courses will vary in their difficulty. Each MOOC will be internally assessed for its difficulty level based on the statuses outlined in Table 1.

Table 1. Detailed outline of difficulty for courses.

Course Level of Difficulty	
Level	**Description**
Introductory	Limited to no pre-existing knowledge of subject matter needed
Intermediate	Established knowledge of subject matter needed
Advanced	High level of knowledge needed, focus on application of knowledge

At least one MOOC will be developed for each of the three proficiencies, allowing for the *SCORE Online Learning* platform to host learners across a wider range of competencies. Further, this will allow for learners to upskill continually through the enrolment in multiple subsequent courses. The course level of difficulty is communicated with learners on each course's main landing page, as seen in Figure 5.

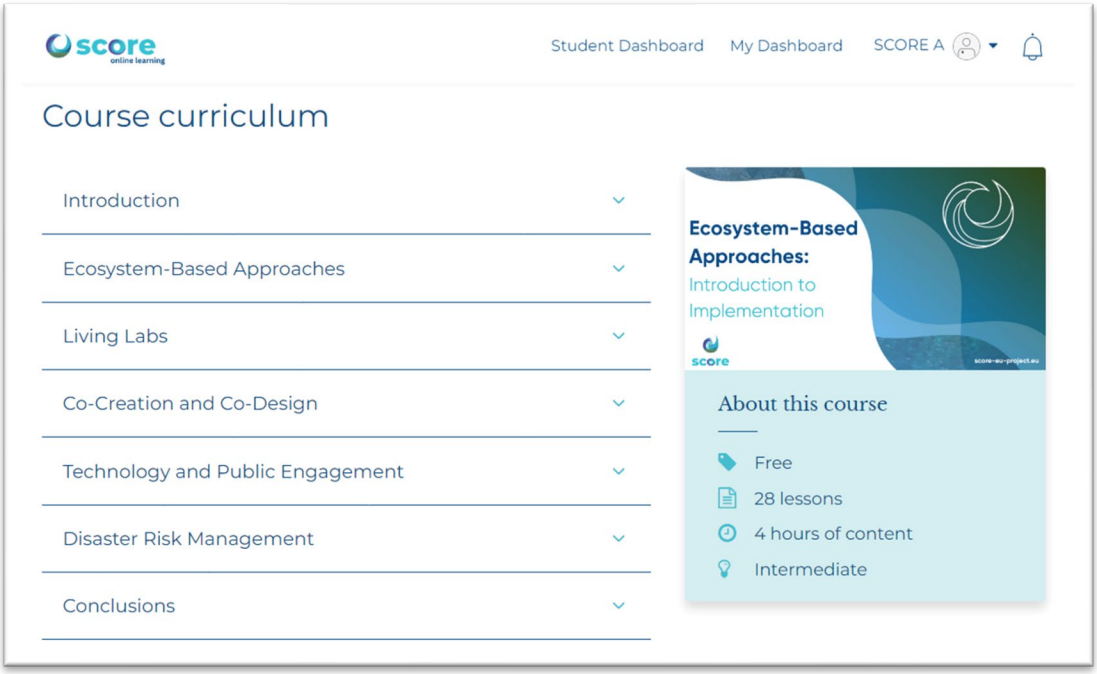

Figure 5. Course curriculum for Course 2 - Ecosystem-Based Approaches: Introduction to Implementation

3.4.5 Evaluation

Learners who successfully complete the modules will receive a non-accredited certification of completion to recognise their efforts (see example in Figure 6). This certification will be provided to those learners who completed all lessons and received a minimum score of 60% across the evaluation activities. This certification can be shared directly from the platform to social media and other online platforms, thereby serving as an amplifier of the course.

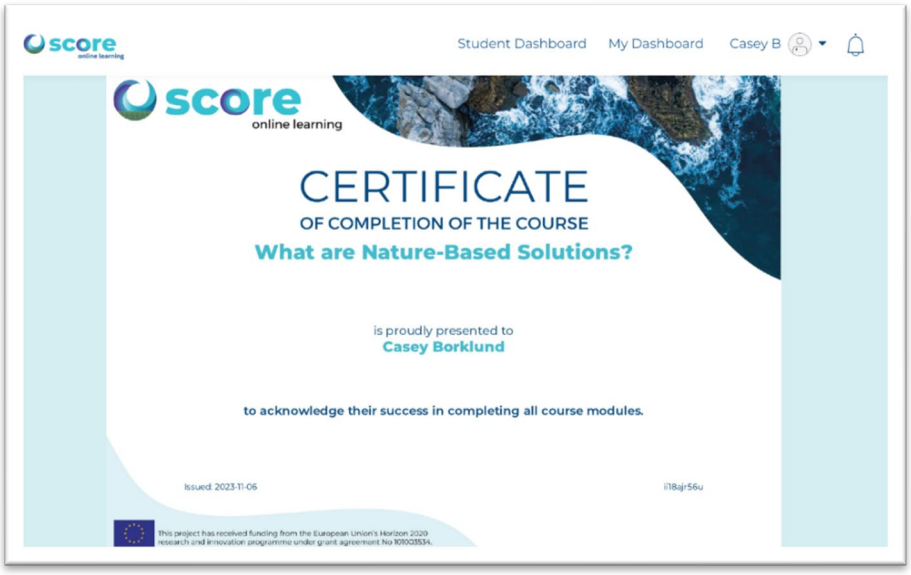

Figure 6. Certificate awarded to all successful participants in a MOOC.

Additionally, the provision of a certificate upon completion serves as an optional verification measure. This is a feature that would be especially for users interested in using a MOOC as a prerequisite for participation in certain

activities. The provision of a certificate essentially can act to verify that these users have necessary context: for example, users such as teachers and students that incorporate the courses within their own curriculum.

3.5 Validation & Amendment Process

To ensure the highest quality content is released, the MOOCs will undergo a thorough development, validation, and amendment process prior to publication. Each course will be subject to an internal trial period and the standard prior notice process before launching and dissemination. The MOOC development process is as follows:

1) The initial concepts can arise either from the MOOC Development Team (ERINN and UCD) or from additional SCORE partners. The MOOC Development Team will then begin the development of the course concept by identifying the overall learning objectives, key target users, and available internal resources relevant to the topic.
2) The MOOC Development Team proposes an outline of the course and obtains approval from any relevant partners, such as those involved in the development of the source materials. Following an internal review period that consists of any necessary initial meetings and subsequent feedback, this MOOC outline will then be developed into a MOOC script for additional review.
3) The script will undergo a review process from relevant partners, and feedback will be incorporated into a final script version.
4) ERINN will upload the content to the *SCORE Online Learning* platform as an unlisted, hidden course. At this step, ERINN will ensure appropriate branding and course parameters are consistent across MOOCs.
5) The partners who contributed to this module will have the opportunity to review this module in Thinkific and provide any final feedback to the course on the platform. ERINN will incorporate any feedback provided at this step.
6) Once the contributing partner has reviewed/approved the module(s), the module(s) will be shared with the whole SCORE consortium, for testing and feedback. Alongside this review period, the MOOC content will undergo prior notice process as outlined in the Plan for the Exploitation and Dissemination of Results (PEDR).
7) Following the prior-notice and feedback collection period, any necessary changes to the MOOC will be made. Once approved by SCORE partners, the dissemination and promotion of the MOOC begins with the support of Euronovia and relevant partners.
8) Should amendments be needed, partners can contact the MOOC Development Team (ERINN, UCD) who can discuss/rectify any issues that come to light.

Through this multi-step process, educational materials provided through the MOOC are repeatedly checked to ensure accuracy. Further, this allows for collaboration between the MOOC Development Team and SCORE partners, ensuring appropriate representation of project outputs and activities.

4. USER EXPERIENCE

As previously shown, the *SCORE Online Learning* platform was specifically chosen, developed and designed to maximise usability for target users. This is seen through the accessible and unique layout of each course. Figure 7

below is an example of the module *Ecosystem-Based Approaches in Coastal City Living Labs (CCLLs)* from Course 2: *Ecosystem-Based Approaches: Introduction to Implementation*.

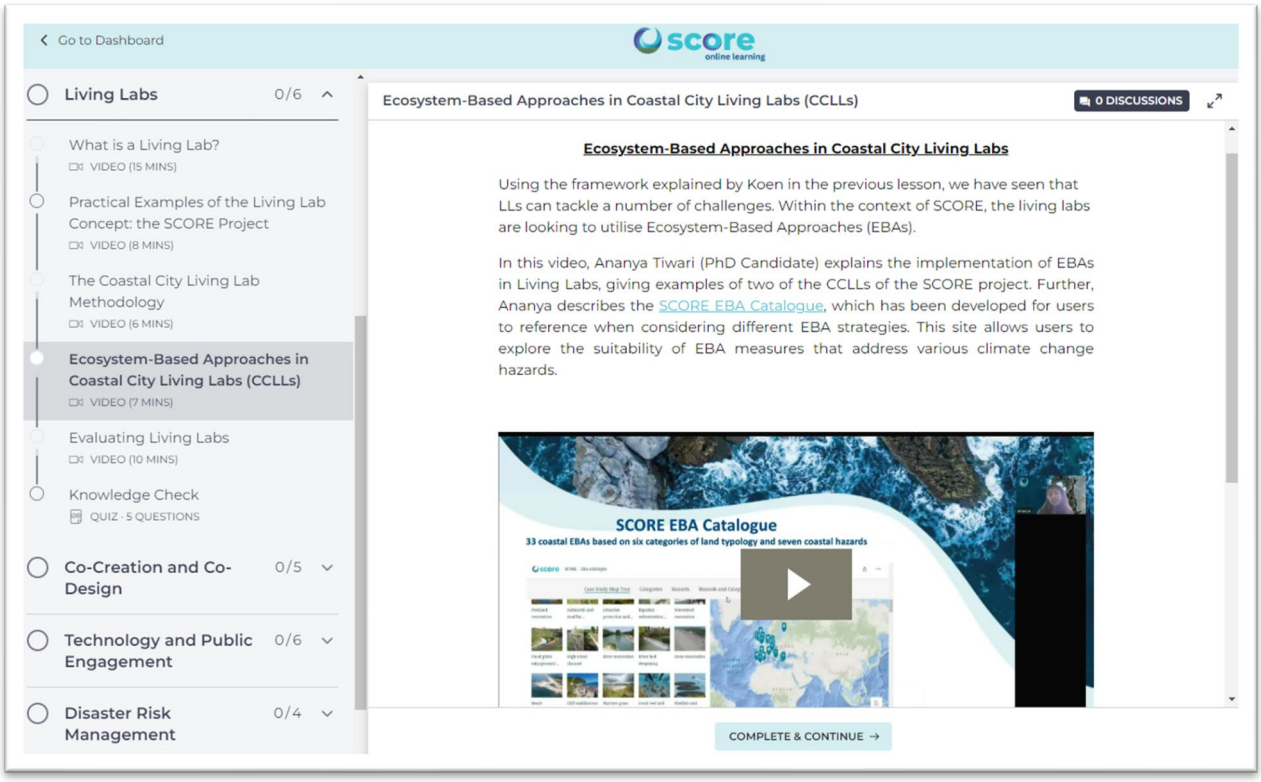

Figure 7. Example of the display of a module from Course 2.

From a learner's screen, one can see the full course modules, lessons, and their progress reported on the left navigational ribbon. This also gives learners an average time per lesson, allowing them to leave and resume elements of the course as they wish. Learners can navigate to earlier lessons but cannot progress further without completing the necessary elements of each module and passing the knowledge checks. This ensures that learners progress in their development appropriately but can reference earlier elements if necessary.

Within a lesson, a learner can read through the text material and watch any available videos. Further, highlighted hyperlinks will bring learners into separate windows to expand their knowledge and explore new resources. These resources can be those both developed by SCORE (such as the EBA catalogue featured in Figure 7) or relevant to a holistic understanding of the subject matter (such as the Sustainable Development Goals or other EU projects). This allows for further learning and a more expansive reach. Documents can also be uploaded into lessons as supplementary material. For example, lecture slides accompanying webinars have been embedded within relevant lessons. This was also utilised for the glossary of terms (Annex III) which is embedded in the introduction lesson for *Course 2 – Ecosystem-Based Approaches: Introduction to Implementation* for learners to download to aid them in navigating through new terms provided throughout the modules.

An example of a knowledge check is shown in Figure 8 from the module *Past, Present, and Future* from Course 1: *What are Nature-Based Solutions?* Upon submitting an answer, learners will immediately receive their score and feedback through a detailed explanation for the answer. This explanation will show why a learner got a question correct or incorrect, as well as provide additional links if a learner is interested in further expanding their knowledge on a subject.

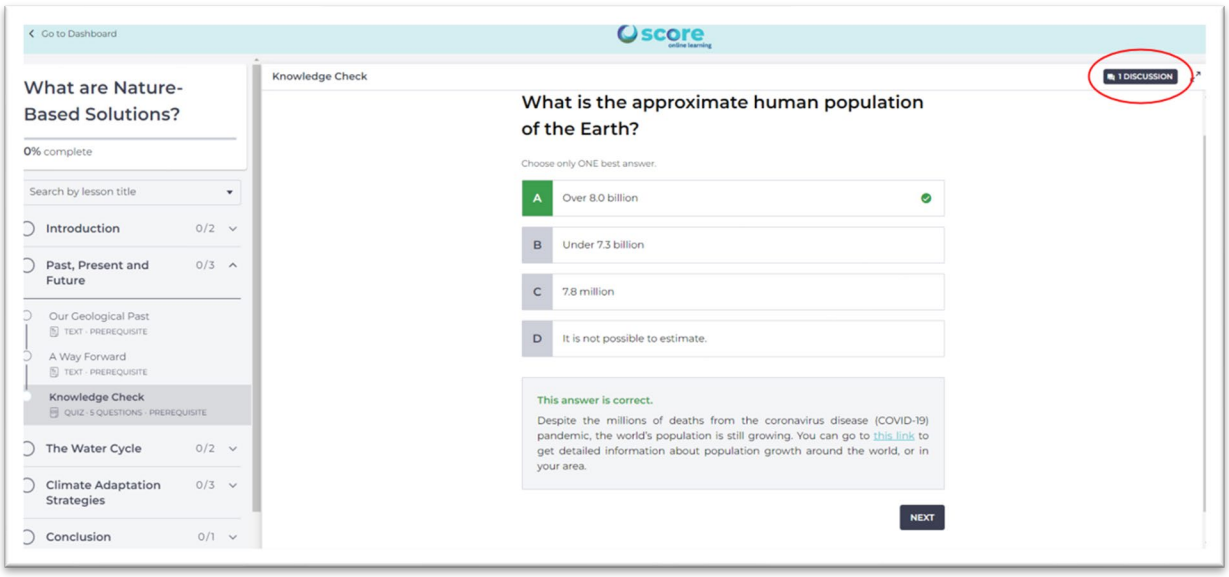

Figure 8. An example of a learner's view of a knowledge check question that they answered correctly.

Take note of the discussion section in the top right corner for this knowledge check (highlighted in red): a key element of the platform is that learners can engage with fellow learners to discuss topics, or they can engage with instructors if they have questions or require clarifications. This feature is included in all lessons throughout all MOOCs and is moderated by the MOOC Development Team.

5. COURSE CONTENTS

Following the process outlined above, numerous MOOCs can be developed through the course of the SCORE project to achieve overall learning objectives and reach numerous target audiences. To date (December 2023), 2 courses comprising of 8 content modules have been fully developed and are now live on the *SCORE Online Learning* platform. Their overall user design and content are detailed in Chapter 5.1 below.

These live courses will serve as examples for the design and implementation strategy for future MOOCs developed over the course of the project. The *SCORE Online Learning* site will continue to serve as a platform to showcase SCORE outputs and create further materials for users both internal and external to the project. A minimum of 30 modules will be developed for use on the *SCORE Online Learning* platform. The plans to meet these targets is further detailed below in Chapter 5.2.

5.1 Available Courses

At present, two courses are currently live and available for enrolment. In total, there are 8 content modules and 32 lessons, which are modules with set learning objectives (this excludes introduction and conclusion modules). These courses highlight outputs primarily from the first 30 months of the project and include material from the first EBA Training School. The sections below provide details to the level of difficulty, the key target audience the course is applicable to, the major objectives of the course, and an overview of the content delivered within each module.

5.1.1 Course 1: *What are Nature-Based Solutions?*

Domain: https://score.thinkific.com/courses/what-are-nature-based-solutions

Level of difficulty: Introductory

Target audiences: the general public, students, citizen scientists, municipalities / local policymakers, participants in CCLLs or living labs, and sustainability enthusiasts.

Objectives: The key learning outcome of this course is to provide learners with the necessary context to understand the role that Nature-Based Solutions and Ecosystem-Based Approaches can have in climate resilience. By the completion of the course, learners will have:

- Journeyed through the geologic past and uncovered how human activities have played a significant role in shaping the planet.
- Considered the essential workings of the water cycle, understanding that it has a profound impact on the health of the planet, influencing everything from climate patterns to freshwater availability.
- Gained a deeper understanding of the urgent need for sustainable solutions to safeguard our planet's delicate resources and ecosystems.
- Explored the concepts of Nature-Based Solutions (NBS) and Ecosystem-Based Approaches (EBAs).

Course Content: Table 2 details the outline of the course, which is comprised of 3 learning modules: each module is punctuated by a knowledge check (a quiz).

Table 2. Course 1 structure detailing each module, lesson, and associated SCORE materials highlighted in the course.

Course 1: *What are Nature-Based Solutions*?				
#	**Module**	**Lesson Sections**	**Lesson Summary**	**SCORE Materials**
1	Past, Present, and Future	Our Geological Past	Broad background on human impact on the climate and introduction to climate challenges.	• Citizen Science Playbook (Draft)
		A Way Forward	Proposed solutions to challenges and examples of current work being done within this space.	
		Knowledge Check	Quiz.	
2	The Water Cycle	Introduction to the Water Cycle	Overview of the water cycle, its importance, and some elements of human impact on these processes.	• Citizen Science Playbook (Draft)
		Knowledge Check	Quiz.	
3	Climate Adaptation Strategies	Nature-Based Solutions	Explanation of NBS and their value in addressing climate-change related challenges.	• Citizen Science Playbook (Draft) • Link to SCORE EBA Catalogue
		Ecosystem-Based Approaches	Details of EBAs and how they address climate challenges.	
		Knowledge Check	Quiz.	

5.1.2 Course 2: *Ecosystem-Based Approaches: Introduction to Implementation*

Domain: https://score.thinkific.com/courses/ecosystem-based-approaches

Level of difficulty: Introductory / Intermediate

Target audience: policymakers and public sector workers, students, citizen scientists, sustainability enthusiasts.

Objectives: The key learning objective of this course is to provide learners with a thorough understanding of what EBAs are and how they can be implemented into real-world scenarios. Through the completion of this course, learners will gain a comprehensive understanding of:

- What Ecosystem-Based Approaches are and how they are useful in creating sustainable, resilient, and adaptable communities in the face of a changing climate.
- The design, implementation, and evaluation of dynamic and collaborative Living Labs as a means to test and evolve various EBA solutions.
- The differences between co-creation and co-design, and how these processes are important to consider when developing solutions to climate challenges.
- Effective strategies for engaging with the public, including examples of citizen science and innovative uses of technology to reach new audiences.
- The importance of identifying and modelling disaster risk to inform more effective management schemes.

Course Content: Table 3 details the outline of the course, which is comprised of 5 content modules and 24 lessons.

Table 3. Course 2 structure detailing each module, lesson, and associated SCORE materials highlighted in the course.

Course 2 – Ecosystem Based Approaches: Introduction to Implementation				
No.	**Chapter Title**	**Lesson Sections**	**Lesson Summary**	**SCORE Materials**
1	Ecosystem Based Approaches	Introduction to Ecosystem-based Approaches	Overview of EBAs and their role in addressing climate change related challenges.	• SCORE Webinar Lecture: The potential of Ecosystem-based adaptation in coastal areas • SCORE Webinar Lecture: Design and Implementation of EbA solutions in coastal areas • Citizen Science Playbook (Draft)
		Design and Implementation of EBAs	Explanation of methods for implementing EBAs.	
		Building with Nature	Examples of EBAs in practice.	
		Knowledge Check	Quiz.	
2	Living Labs	What is a Living Lab? (LL)	Overview of Living Labs and their opportunity as a space for EBAs to be tested.	• SCORE Webinar Lecture: The Coastal Cities Living Lab Framework • SCORE Webinar Lecture: Introduction to the SCORE Project • SCORE Webinar Lecture: The Coastal Cities Living Lab Evaluation Framework • EBA Training School Year 1 Lecture: Ecosystem-Based Approaches in Coastal City Living Labs • Link to SCORE EBA Catalogue
		Practical Examples of the Living Lab Concept: the SCORE Project	Example of Living Labs in Practice.	
		The Coastal City Living Lab Methodology	Overview of CCLL design and implementation.	
		Ecosystem - based Approaches in Coastal City Living Labs (CCLLs)	Examples of EBAs being implemented in Living Labs.	
		Evaluating LLs	Overview of the importance of evaluating Living Labs.	
		Knowledge Check	Quiz.	
3		Introduction to Co-creation and Co-design	Overview of key definitions of co-creation and co-design	

	Co-creation and Co-design	The Co-creation toolkit	Detailed explanation of co-creation process with relevant examples and tools.	• SCORE Webinar Lecture: Co-creation and Co-Design, including tools and methods • SCORE Webinar Lecture: Co-creation tools and methods • SCORE Webinar Lecture: Co-design in Zagreb • Co-Create your City Toolkit
		Co-design in practice: Zagreb Case Study	Example of co-design in practice within EU projects.	
		Knowledge Check	Quiz.	
4	Technology and Public Engagement	What is Citizen Science?	Overview of key concepts related to citizen science.	• EBA Training School Year 1 Lectures: Citizen Science and SCORE low-cost sensors • EBA Training School Year 1 Lecture: The Digital Twin • EBA Training School Year 1 Lecture: SCORE-Craft Minecraft Worlds • Link to SCORE Sensor Catalogue
		Smart Technology and Co-Monitoring	Examples of methods to utilise technology within citizen science programmes.	
		Conducting Citizen Science	Examples of citizen science from the SCORE project.	
		The Digital Twin	Overview of the Digital Twin and its value in monitoring climate-related changes.	
		Using Technology to Reach New Audiences	Example of use of Minecraft in reaching new audiences to learn about EBA solutions.	
		Knowledge Check	Quiz.	
5	Disaster Risk Management	Introduction to Disaster Risk Management	Overview of the importance of assessing and addressing climate-change related risks.	• Deliverable 1.2 - Map and report of key climate related hazards • SCORE Webinar Lecture: Risk modelling and its role in designing strategies to increase financial resilience
		Risk Modelling	Explanation of different available models to understand risk.	
		Risk Financing	Overview of finance mechanisms to address risk.	
		Knowledge Check	Quiz.	

5.2 Future Courses

As the *SCORE Online Learning* platform is a living resource, the MOOC Development Team will continually work to develop additional modules throughout the project's lifetime. Future courses running alongside the EBA Training Schools, which will take place in 2024 and 2025, are currently in the process of development, and plans for further course opportunities are also being explored. These plans are detailed below.

5.2.1 EBA Training Schools

Promoted as the 'SCORE Climate Adaptation Training School', the EBA Training Schools will follow the format of the 2023 EBA Training School. A three-day programme with a one-day online event to launch the programme where the focus will be on policy and research outputs from the project and two days that will be filled with a series of local-level and online events, including citizen science activities, and sharing of resources developed under the project. The second annual training school is currently planned to take place over late March/early April 2024.

To further enhance the educational value of the EBA Training School and ensure that the knowledge gained is accessible to a wider audience, associated lectures and workshop materials will be uploaded to the *SCORE Online Learning* platform. This will allow individuals from around the world to participate in the training and gain valuable insights into climate adaptation. They will also be made available in multiple languages to ensure that they are accessible to our global audience.

Project outputs, particularly those related to citizen science activities from WP4, will be continuously integrated into the platform to support this goal. The *SCORE Online Learning* platform will serve as a central repository for workshop materials, providing direct links to resources such as tutorial videos, manuals, e.g., DIY low-cost sensor assembly/deployment tutorials developed under WP4. This diverse collection of media, encompassing videos, written manuals, and interactive digital tools, aims equip CCLLs with the skills and resources to plan and deliver their own activities, fostering a sustainable legacy after the project's formal end.

5.2.2 Additional MOOC Development

To achieve a minimum of 30 modules developed for the *SCORE Online Learning* platform, the MOOC Development Team has outlined four key opportunities to be utilised to develop future MOOCs, all of which adhere to the overall learning goals and identified target audiences. These opportunity streams and potential examples are as follows:

Opportunity 1: Highlight project outputs and resources for a wide range of audiences external to the project. Some examples might include:

- Utilisation of SCORE webinar lectures into knowledge check courses.
- Training on how to use any catalogues developed for the project.

Opportunity 2: Serve as effective elements of Knowledge Transfer Plans for appropriate Knowledge Outputs. Appropriate options will be chosen throughout the Knowledge Transfer process. Some examples might include:

- Showcasing how to use Pilot Operational Plans in the setup of a new CCLL.

Opportunity 3: Allow for more effective training of both SCORE partners and citizen participants to the project.

- Introductory course on the key elements of the SCORE project.
- Guidelines for SCORE partners on policy brief writing.
- Onboarding material for incoming participants to citizen science projects associated with the SCORE project. This will standardise and streamline onboarding for new members, allowing for wider and more engaging education for citizen scientists to have an appropriate baseline.

Opportunity 4: Allow for dissemination of materials in additional languages as requested by the CCLL teams, allowing for more outreach and inclusion of audience members. Examples might include, where possible and with support of appropriate partners:

- Language-specific Lectures and associated materials from CCLL segments of EBA Training Schools.
- Translations into key languages for developed MOOCs.

These are the identified key areas for the MOOC Development Team to explore as they continue to develop courses that would have the most impact for learners.

6. DISSEMINATION PLAN

The dissemination and amplification of each MOOC and the overall *SCORE Online Learning* platform are extremely important to reach our target audiences. Following the strategies outlined in the PEDR, each MOOC will be shared broadly and periodically on SCORE's social media pages, website, newsletter, among others. Target groups for each MOOC (such as citizen science programmes, relevant LinkedIn community groups, and/or secondary schools) will be identified and reached out to effectively maximise impact.

Further, MOOCs will undergo the Knowledge Transfer process as part of Task 9.3, for which the Innovation Board will support ERINN and UCD to develop a tailored exploitation and dissemination strategy. The Innovation Board and Task 9.3 task lead ERINN will develop a Knowledge Transfer Plan for the *SCORE Online Learning* platform beyond the lifetime of the project, extending its impact.

Additionally, for each course, WP9 will collectively develop materials for dissemination on social media and other channels and keep the branding consistent between SCORE and the modules. Examples of these materials are provided in Figure 9 and Figure 10 below.

Figure 9. Dissemination material for the SCORE Online Learning Platform.

Figure 10. Dissemination material for Course 2 - Ecosystem-Based Approaches: Introduction to Implementation.

By using the dissemination materials, the available MOOCs have already undergone some promotion on social media channels and within identified LinkedIn communities. Additionally, the MOOCs will also be promoted at events using these tools. For example, promotional notecards were most recently shared at the Open Living Lab Days event in Barcelona in September 2023. The *SCORE Online Learning* platform will also be added to the Horizon Results Booster, and the MOOC Development Team will amplify the MOOCs to other EU projects through the networking Task 9.5.

All outreach activities will be appropriately recorded to both measure impact and to analyse best practices for reaching target groups. A benefit of the Thinkific platform is the ability to see both enrolments and progress statistics for users. This is useful in measuring the number of learners enrolled following dissemination or communication actions, which can allow for the MOOC Development Team to be aware of best practices and identify gaps in outreach. As of 8th December 2023, Course 1 (live as of 15th September 2023) and Course 2 (live as of 22nd November 2023) have had a combined total of 365 enrolments.

7. CONCLUSION

Through the development of the *SCORE Online Learning* platform hosting multiple Massive Open Online Courses, we aim to enable the project to reach a wider audience and provide valuable climate action knowledge to citizens in Europe and worldwide. The SCORE MOOCs offer learners with an affordable and flexible way to learn new skills and receive quality educational experiences at scale through this open-source and equitable opportunity for self-guided learning. The *SCORE Online Learning* platform serves as an excellent tool to both highlight the work being done through the SCORE project, as well as extend the impact of the project on users across the globe. To visit the *SCORE Online Learning* platform and explore current live MOOCs as they are added, go to https://score.thinkific.com/.

ANNEX I: MOOC CONTENT SUBMISSION FORM

MOOC Content Submission Form	
Contact Person(s):	
Work Package:	
Associated Deliverable:	
Thematically, what does your content align most closely to:	
What is the aim of this module?	
What is the learning outcomes for your course?	
What format(s) is the content available in (videos, written text, webinar etc.). Please provide a brief description of what each material consists of.	
Would you be interested creating a short (10 minute) presentation on the content? If yes, the best way to do this is to set up a meeting in Zoom with only yourself and record the presentation.	
Please provide 5 evaluation questions and answers to be included: Example: Q1: What is an Ecosystem-Based Approach to Climate Change Adaptation? A. It is an approach which involves using nature for human profit and commercial purposes B. An approach that makes use of biodiversity and ecosystem services as part of an overall adaptation strategy to the adverse effects of climate change, and to increase resilience C. It is an approach which focuses on fossils to predict the future D. It is an approach which causes a lot of damage to living beings and the environment The answer is b) There are many working definitions of ecosystem-based approaches (EBAs)and climate change adaptations and/or nature-base solutions (NBS). What they share is development of integrated planning against climate change that involves the natural environment and what it can sustainably provide, in relation to human and other species and what they need. Climate change and global warming has increased the deployment of this methodology in research and practice. See for example: https://climate-adapt.eea.europa.eu/eu-adaptation-policy/sector-policies/ecosystem https://climate-adapt.eea.europa.eu/metadata/publications/nature-based-solutions-in-europe-policy-knowledge-and-practice-for-climate-change-adaptation-and-disaster-risk-reduction	
Are there supplementary slide decks or other relevant materials (i.e., videos, infographics, etc.) to be included? (if yes, please attach):	

ANNEX II: WEBINAR GUIDANCE DOCUMENT

SCORE - EU H2020 Grant Agreement N° 101003534

Introduction

WP9 (T9.6) is currently laying the foundation for the EBA Training Schools and SCORE's MOOC (massive-open-online-course). We would like to utilise the SCORE webinars that all WPs are preparing as content for the MOOC. As a presenter, this will serve to increase the reach and impact of your research. To ensure we can transition from webinar to MOOC as seamlessly as possible, please consider the following for your webinar.

Before the Webinar

Consider utilising the following structure:

1) Please provide clear introductions for each of the presenters.
2) Present your specific challenge
3) Present your solutions/work
4) Outline what the impact of your Work Package is beyond the lifetime of SCORE.

Please clearly label the chapters/sub-sections of the presentation; most likely we will edit the webinar down into smaller pieces for the MOOC, so having the subsections clearly titled will be extremely helpful!

As a design tip for the slides, remember that "less is more". Viewers cannot read and listen at the same time, so by providing less written information, you encourage them to listen to you.

MOOC Audience

Key Stakeholders / Participants:

1. **SCORE CCLL stakeholders:** The local CCLL stakeholders may experience a learning curve when first engaging with the SCORE project and the CCLLs. The SCORE MOOCs can serve as a tool to empower stakeholders by providing supplementary background information on what SCORE is doing and why. By fostering this additional engagement with SCORE and the CCLL, the MOOC can encourage local stakeholders to continue engaging with the SCORE approach beyond the project's end date.
2. **Living Labs in other EU-funded projects:** Building competencies with the terminology and framework used in establishing a living lab takes a significant amount of time for stakeholders unfamiliar with the process. External EU projects establishing living labs and EBA/NBS could use these resources to allow their respective stakeholders the opportunity to learn about these concepts in the early stages of the project, thereby fostering a more productive living lab engagement process.
3. **Local municipalities, including public servants and practitioners**: For local communities with a particular interest in increasing their resilience to climate change, the MOOCs can provide practitioners and policy makers an opportunity to understand how SCORE approaches can be applied within their context, the materials and skillsets needed to implement, and the opportunities for change when applied. Notably, the introductory courses can provide a simple, accessible way to gain the scientific and methodological background necessary to understand the proposed climate and community-based solutions.

SCORE - EU H2020 Grant Agreement N° 101003534

4. **Students & Teachers:** SCORE MOOCs will provide secondary and post-secondary students the opportunity to educate themselves on topics such as Nature-Based Solutions, co-creation and co-design, the development of living labs, and the role of technology in community engagement. The MOOC will achieve by using both theoretical descriptions and practical examples to provide a comprehensive understanding of key concepts, while highlighting the work done through the SCORE project. SCORE MOOCs are a unique way for a student to engage more creatively with scientific content, making the courses a great addition for any teacher to add to their curriculum as primary or supplementary material.
5. **Citizens/General Public**: For anyone interested in the SCORE approach, specifically Nature-Based Solutions, citizen science and climate change, the MOOCs provide them with an introduction to these concepts, and if interested, more challenging modules to upskill in these areas.

During the Webinar

- All participants and non-presenting speakers should be muted to reduce background noise. Designate one person on your team to be the "muter" if any participants forget to do so.
- Please try to use the best quality microphones available to you and ensure there is sufficient lighting in your space to capture your voice and image as best as possible.
- PLEASE RECORD THE WEBINAR
  - Ensure the Zoom settings are set to record only the speaker to protect the identity of the participants. We will edit out any clips where other non-SCORE faces are shown.
  - Record in the highest quality possible.
  - Euronovia will help with establishing the Zoom/Event (m.voltz@euronovia.eu)

Post Webinar

Following the webinar, please complete the following questions and email them to ERINN (rochelle@erinn.eu and casey@erinn.eu). This will help us quickly organise the content and understand who the target audience should be.

- Provide a summary of the main learning outcomes for the MOOC description/dissemination
- What background information listeners will need to understand this webinar?
- Who was the target audience for this webinar? What type of educational background would the listener ideally have?
- Provide 1-2 appropriate reflection questions for someone who has viewed your presentation?

Questions

If you have any questions or need support, please do not hesitate to contact the MOOC Development team (rochelle@erinn.eu and casey@erinn.eu)

ANNEX III: GLOSSARY OF TERMS FOR COURSE 2

score
online learning

Glossary of Terms

Ecosystem-Based Approaches: Introduction to Implementation

Coastal City Living Lab (CCLL): An innovation intermediary, which orchestrates an ecosystem of actors in a specific region to tackle specific challenges related to sea level rise, coastal erosion and extreme events.

Citizen science: The collection and analysis of data relating to the natural world conducted by citizens, typically as part of a collaborative project with professional scientists.

Co-creation: A process that, based on the identified needs, aims to develop results that involve knowledge flows and absorptive capacities from all actors involved across the entire economic and social environment, referred to the addressed needs.

Co-design: A specific instance of co-creation that refers to the creativity of designers and people not trained in design working together in the design development process.

Digital twin: A virtual representation that uses real world data to create simulations that can predict how a product or process will perform if parameters are changed.

Ecosystem-Based Approaches (EBA): Solutions that focus on ecosystem restoration and enhancement of ecosystem services to protect society against negative impacts of climate change.

Ecosystem services: The multitude of benefits (direct and indirect) that nature provides to society. The Millennium Ecosystem Assessment defined four categories of ecosystem services that contribute to human well-being, each underpinned by biodiversity: provisioning services; regulating services; supporting services, and cultural services.

Financial resilience: The design of financial instruments (traditional insurance, natural disaster funds, insurance linked securities, etc) to cope with economic losses.

Nature-Based Solutions (NBS): 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.

Smart Control of of the climate resilience in European coastal cities (SCORE)*: A* four-year EU-funded project aiming to increase climate resilience in European coastal cities. The project will tackle specific challenges related to sea levels, coastal erosion and extreme weather events using an integrated solution of smart technologies and nature-based solutions.

The SCORE project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101003534