



Deliverable 4.5: Final Exploitation Plan

BioBeo

Innovative Education for the BioEconomy



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the European Union



Project factsheet

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Maynooth University, Ireland (MU)

An Taisce, Ireland (AnT)

Universitaet Hohenheim, Germany (UH)

ODISEE University of Applied Sciences, Belgium (OUAS)

Center for Social and Economic Research, Poland (CASE)

Rotterdam University of Applied Sciences, Netherlands (RUAS)

SYNYO GmbH, Austria (SYNYO)

Foundation for Environmental Education, United Kingdom (FEE)

Youth in Science and Business Foundation, Estonia (YSBF)

Hellenic Education Society of STEM, Greece (E3STEM)

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Abbreviations

| | |
|----------|--|
| AnT | An Taisce – The National Trust for Ireland |
| AR | Augmented Reality |
| BEST | Bioeconomy Education and Sustainability Teachers Network |
| BIP | Blended Intensive Programme |
| BOS+ | BOS+ Vlaanderen VZW |
| CASE | Center for Social and Economic Research, Poland (also Centrum Analiz Społeczno-Ekonomicznych-Fundacja Naukowa) |
| CC | Creative Commons |
| CC0 | Creative Commons Public Domain Dedication |
| CC BY | Creative Commons Attribution |
| CC BY-NC | Creative Commons Attribution-NonCommercial |
| CC BY-ND | Creative Commons Attribution-NoDerivatives |
| DEC | Deliverable Type (used for dissemination, exploitation and communication specific formats such as Website navigation, mobile app, web-based app, videos, etc.) |
| E3STEM | Hellenic Education Society of STEM (also Elliniki Expaidektiki Enosi STEM) |
| EC | European Commission |
| EU | European Union |
| EVNT | Event, conference, seminar, workshop, etc. (Abbreviation used in EC portal) |
| FAIR | Findable, Accessible, Interoperable and Re-usable |
| FEE | Foundation for Environmental Education |
| GA | Grant Agreement |
| GADs | Global Action Days |
| IP | Intellectual Property |
| IPA | International Parents Alliance (also Stichting International Parents Alliance) |
| IPR | Intellectual Property Rights |
| KER(s) | Key Exploitable Results |
| LEARN | Learning and training, including learning modules and curricula |
| MU | Maynooth University |
| OUAS | ODISEE University of Applied Sciences (also Odisee) |
| PC | Project Coordinator |
| PO | Policy recommendation, guidance, awareness raising, advocacy |
| POIs | Points of Interest |
| PROD | Product (new or improved) |
| PU | Public (Dissemination level) |
| RUAS | Rotterdam University of Applied Sciences (also Stichting Hogeschool Rotterdam) |
| SDG(s) | Sustainable Development Goal(s) |
| SERV | Service (new or improved) |
| SYNYO | SYNYO GmbH |
| TUB | Technical University Berlin (also Technische Universität Berlin) |
| UCD | University College Dublin |
| UH | Universität Hohenheim |
| UVT | Universitatea Valahia Targoviste |
| VR | Virtual Reality |
| WP(s) | Work Package(s) |
| XR | Extended Reality (encompassing VR/AR) |
| YSBF | Youth in Science and Business Foundation (also Sihtasutus Noored Teaduses Ja Ettevõtluses) |

Executive Summary

The BioBeo project is a groundbreaking initiative aimed at helping everyone understand and get involved in the circular bioeconomy. It features an innovative educational programme that delves into five connected themes: interconnectedness, outdoor learning, forestry, life below water, and the fascinating food loop. This ambitious project wants to bridge the gap between bioeconomy principles and practical education, ultimately promoting sustainable lifestyles, encouraging circular behaviours, and inspiring active citizen participation in shaping bioeconomy policies. Importantly, BioBeo is also dedicated to social equity, actively promoting gender balance and supporting disadvantaged youth, migrant communities, and individuals with additional needs, ensuring everyone is included.

To achieve these goals, the project has developed a wide range of educational resources and practical tools. These include a robust and creative BioBeo education programme with detailed lesson plans for all educational levels. There's also a digital handbook to guide curriculum changes and associated training. For more engagement, the project has created fun board games like 'Resource - Don't Go!' and 'Choco Chase,' along with engaging comics and compelling videos complemented by immersive XR tools. These carefully crafted resources are designed for a broad audience: young people from preschool through university, teachers and teacher education institutes, parents and guardians, educational institutions, education policymakers, businesses in the bioeconomy, and other relevant EU projects and organizations. This comprehensive plan ensures these valuable resources are widely accessible, maximizing the lasting legacy and impact of the BioBeo project.

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1. Introduction

1.1 Introduction to BioBeo and its Core Vision

The BioBeo project, with its 15 partners, bridges theory and practice to develop and deploy an education programme focused on lifestyle, circularity, and the bioeconomy through five core themes: interconnectedness, outdoor learning, forestry, life below water, and the food loop. The project aims to foster better coordination between bioeconomy and education, addressing social issues like gender bias and disadvantaged youth groups. The exploitation strategy is designed to ensure that the innovative educational tools, networks, and approaches developed continue to inspire and educate diverse audiences across Europe.

BioBeo introduces new thinking and approaches in education on the circular economy across Europe based on the research of leading EU institutions partnering to advance knowledge in the field. The project seeks to strategically surmount both institutional and cultural barriers to implementing relevant circular bioeconomy education programmes in preschool, primary, and secondary schools, through defining and delivering novel curricula in schools. The aim is to enhance societal involvement through young people's and citizens' involvement in policy-making for the bioeconomy.

1.2: Final Exploitation Plan

This Final Exploitation Plan (**Deliverable 4.5**) outlines the strategies and pathways for ensuring the lasting impact and continued use of the BioBeo project's results beyond its official duration. This plan builds on D4.3 Initial Exploitation Plan, which laid the groundwork for identifying Key Exploitable Results and determining initial exploitation pathways. Exploitation, as defined by the Grant Agreement, involves using project results in further research and innovation activities, including commercialization, service provision, or standardization activities. The BioBeo project's overall aim is to enhance understanding and engagement with the bioeconomy and to inspire future generations to pursue related careers, contributing to a sustainable EU circular bioeconomy. This plan focuses on maximizing the reach, sustainability, and societal benefits of the project's key outputs.

1.3: General Exploitation Principles

The BioBeo project's exploitation strategy is fundamentally rooted in maximizing the reach and enduring impact of its Key Exploitable Results (KERs) and other valuable outputs. This involves a comprehensive and strategically planned process of dissemination and communication that commenced at the project's outset and will continue beyond its official lifetime. As detailed in Deliverable 4.4 'Final Report on Dissemination and Communication Actions', this overarching strategy has been executed through a multi-faceted approach, leveraging various channels and tools to engage a wide array of target audiences.

Key Strategies for Maximising Reach and Impact:

- **Phased Dissemination and Communication Approach:** The project adopted a three-stage model to ensure targeted and effective outreach:
 - Stage 1: Dissemination for Awareness: Initial efforts focused on raising general awareness about bioeconomy-related education among diverse interest groups across the European Union, laying the groundwork for broader engagement.
 - Stage 2: Dissemination for Action: The focus shifted to delivering the BioBeo education programme, digital toolkits, and other relevant outcomes, stimulating stakeholders to mobilize and take specific actions. This stage also emphasized gathering new contact details for extended future outreach.
 - Stage 3: Dissemination for Results: The final stage is dedicated to communicating the project's accomplishments from Work Package 2 (Innovative Governance) and Work Package 3 (Bioeconomy Education Programme) to both selected stakeholders and the broader EU citizenry.
- **Centralized Web Hub:** The BioBeo website (www.biobeo.eu) serves as the primary and central gateway for all project information, educational materials, and results. Designed with an emphasis on usability and readability, it has sections for the Education Programme (categorized by age groups), Curriculum Change (featuring a clickable flowchart), and Further Resources (compiling multimedia outputs like videos, comics, and games). The website is guaranteed to be hosted for three more years after the project's end (but probably maintained for five to seven years), and has been expanded to make materials like guides, tips, templates, and reports freely available.
- **Robust Social Media Engagement:** Recognizing social media as a crucial information source for key target groups, BioBeo maintained a strong presence on platforms like X (formerly Twitter), LinkedIn, and Instagram. These channels were actively used for spreading information, engaging with external parties, and disseminating publicly available deliverables, publications, and teaching materials. Over 3,700 accounts follow the project's activities, with more than 3,000 posts created across platforms.
- **Diverse Communication Materials:** A wide range of communication and dissemination materials were developed to present, summarize, and promote the project's outputs. These include project templates, presentations, flyers (general and festival-specific), press releases, posters, banners, roll-ups, factsheets, stickers, and graphics illustrating bioeconomy themes. The project also produced multiple animated and instructional videos (totaling 18), three comics, and two board games ("Resource – Don't Go!" and "The Choco Chase").
- **Open Access and Intellectual Property Rights (IPR) Management:** A core principle is to ensure open access to project results wherever feasible. Peer-reviewed scientific publications are made available through open access routes, utilizing platforms like Open Research Europe and Zenodo, and typically under Creative Commons licenses (e.g., CC BY, CC BY-NC, CC BY-ND). Data associated with publications are made available under a Creative Commons Public Domain Dedication (CC0) in line with FAIR principles (Findable, Accessible, Interoperable, and Re-usable), adhering to the "as open as possible

but as closed as necessary" principle. While BioBeo's IPR is primarily associated with copyrights for its various works (software, books, reports, cartoon characters), the project continuously manages its IPR to balance protection with broad dissemination.

- **Strategic Event Participation and Synergies:** The project actively participated in over 20 external conferences and multiple co-organized events at regional, national, and European levels to stimulate interest from new stakeholders and the general public. Key events included the BioBeo Festival in Brussels (March 2024), and the final event (April 2025) co-hosted with the GenB project, which showcased various outputs to 140 participants. Synergies were built with other EU-funded initiatives like GenB and GreenScent, and stakeholder groups such as the Bioeconomy Youth Ambassadors. Annual events like FEE Global Action Days were also utilized to raise widespread awareness.
- **Targeted Communication for Stakeholder Engagement:** Communication strategies were tailored for distinct target groups, including young people (preschool to tertiary levels), teachers, initial teacher education institutes, parents/guardians, schools, education policymakers, businesses, and other relevant EU projects and organizations. Key messages emphasized youth engagement, cooperation between science and education, co-creation of materials, and the value of practical, digital, and outdoor learning methods.
- **Post-Project Legacy and Impact Tracking:** Efforts are in place to ensure the project's lasting legacy, including the continuation of the Bioeconomy Matters podcast and the BioBuzz newsletter (rebranded from BioBeo Buzz to support the new Bioeconomy Education and Sustainability Teachers (BEST) Network). The project also commits to tracking its impact beyond completion, leveraging networks like BEST and using the Horizon Results Platform to find interested parties for unexploited results within one year after the project's end.

These general principles and strategies have guided the BioBeo project in its mission to enhance societal understanding of the circular bioeconomy and inspire future generations towards sustainable careers. The following sections will provide detailed exploitation plans for each identified Key Exploitable Result.

2. Key Exploitable Results

The BioBeo project has generated a wide array of deliverables with high societal potential, along with a significant number of additional unforeseen outputs identified throughout the project's activities. The list of Key Exploitable Results (KERs) has developed as the BioBeo project matured. The exploitation pathways for these results focus on open access, widespread adoption, and integration into existing and new educational frameworks, but each plan is individually considered.

BioBeo Education Programme

- **Result Type:** LEARN (Learning and training, including learning modules and curricula).
- **Result format:** REPORT/Lesson Plans
- **Short description of high potential:** Teaching and understanding of the bioeconomy, leading to greater societal awareness of the circularity of all natural resources and how we must strive to move towards a more biobased way of living
- **Audience/Target Group:** Education/training organisation/learners
- **Further information:** A collaborative initiative by BioBeo partners dedicated to advancing environmental literacy and fostering a deep understanding of the Bioeconomy among students worldwide. We have jointly developed comprehensive educational resources aligned with the BioBeo bioeconomy themes: Life Below Water, Interconnectedness, Forestry, Outdoor Learning, and Food Loop. Key Components:
 - **How to: Bioeconomy Education:**
 - The Missing Link - a practical guide for teachers on how to teach bioeconomy (*see below*)
 - What is bioeconomy? BioBeo Introductory video for teachers on how to integrate Bioeconomy to their existing curriculum (*see below*)
 - **Primary School Materials:**
 - BioBeo Education Programme for Primary Schools: Six place-based lesson plans by Maynooth University for outdoor engagement and creative pedagogy in English and Irish Languages.
 - Nurturing Sustainability with Bioeconomy – the primary lesson plans adapted by FEE to international context. These seamlessly integrate the BioBeo themes with the Learning about Ecosystems and Forests (LEAF) programme by the Foundation for Environmental Education (FEE)
 - E3STEM created STEM lesson plans focusing on bioeconomy through beekeeping and interactive bioeconomy education via the BioBeo robot.
 - **Secondary School Materials:**
 - BioBeo Secondary Education Programme: Six place-based lesson plans by Odisee University of Applied Sciences (OUAS) for outdoor engagement and creative pedagogy in English, Dutch, French and Polish.
 - Bioeconomy Workshop plans: 7 workshops for secondary schools developed by Rotterdam University of Applied Sciences (RUAS).
 - BlueCity: Lesson plan based on excursion to Blue City, an innovative business center in Rotterdam, where start-ups work on creative solutions with bio resources (RUAS).
 - E3STEM created two STEM lesson plans exploring ocean currents and climate change impacts, and sustainable agriculture through satellite monitoring, soil consistency and bioproduct development.
 - **Idea Gathering and Youth Engagement Resources:**
 - BioBeo Guidelines for Generating Ideas
 - BioBeo Creativity Techniques
 - How to: Contacting Youth Parliament
 - BioBeo experiments to try – classroom science activities

- **Further Materials:**
 - Mushroom cultivation in the circular bioeconomy
 - BioBeo Career Profiles
- **Exploitation Plan:**
 - Utilised in schools as part of BioBeo Programme
 - Available as public deliverable of the project (D3.1)
 - <https://cordis.europa.eu/project/id/101059900/results>
 - Available on project website <https://www.biobeo.eu/education-programme/>
 - Widely promoted throughout the project online and at events
 - Promoted by the LEAF network
 - Promoted through BIP and teacher education modules (e.g., MU Bioeconomy Elective)
 - A core component of interactions with policymakers
 - Incorporated in curriculum change (e.g. Potential to incorporate into new Leaving Certificate subject 'Climate Action and Sustainable Development' in Ireland)
 - Two newly founded primary schools, LENA and NISA, in Germany are piloting a full primary-level curriculum with a main focus on bioeconomy and circular literacy as part of the circular economy within the bioeconomy. LENA has a stronger focus on the social sciences, while NISA places greater emphasis on MINT subjects and the technical side of the bioeconomy. Both schools emphasise interconnectedness and living in harmony with nature through outdoor learning.
- **Status of steps taken for exploitation (reporting category):** Pilot, demonstration or testing
- **Market maturity (reporting category):** Emerging: growing demand, scarce supply
- **Ownership and Access:** Owned by the creators and made available via open access.

BioBeo Introductory video for teachers on how to integrate Bioeconomy to their existing curriculum

- **Result Type:** Other
- **Result format:** Video and presentation
- **Short description of high potential:** Introductory video for teachers on how to integrate Bioeconomy to their existing curriculum
- **Audience/Target Group:** Education/training organisation/learners, in particular: In-service and trainee teachers
- **Further information:** The 7-minute video was created using Synthesia, an AI-based software. The video is linked to course material that includes the PPT slides explained in the video and additional and very detailed recommendations on bioeconomy-related topics suitable for different subjects from existing curricula. From biodiversity, microbiology and life processes to applied chemistry and products and materials. This comprehensive collection of recommendations on how to integrate bioeconomy-related topics into existing curricula supports teachers in a very practical and accessible way to integrate bioeconomy into their existing lesson plans.
- **Exploitation Plan:**
 - Distribution and promotion to schools, universities, and community groups for interactive learning.
 - Distribution through digital platforms and educational networks.
 - Available on <https://www.biobeo.eu/how-to-bioeconomy-education/>

- Available on the YouTube Channel <https://www.youtube.com/@BioBeoProject>
- Available as a component of the public deliverable of the project (D3.1) <https://cordis.europa.eu/project/id/101059900/results>
- **Status of steps taken for exploitation (reporting category):** Pilot, demonstration or testing; Intellectual property management
- **Market maturity (reporting category):** Emerging: growing demand, scarce supply
- **Ownership and Access:** Owned by the creators and made available via open access

The Missing Link: a practical guide for teachers on how to teach bioeconomy

- **Result Type:** LEARN (Learning and training, including learning modules and curricula).
- **Result format:** REPORT
- **Short description of high potential:** potential to provide link between the theory of bioeconomy education and the lesson plans created within the framework of the project
- **Audience/Target Group:** Education/training organisation/learners
- **Further information:** This guide serves as a missing link between the theory of bioeconomy education and the lesson plans created within the framework of the project. It focuses on the methodology of how interested teachers can set out and engage all school stakeholders (students, parents, colleagues, non-teaching staff, etc.) in teaching about the bioeconomy. It gives practical advice and provides hands-on tools that support the teachers in their everyday work (not just when teaching bioeconomy). It also includes several tools for self-reflection, self-evaluation and dissemination to enable sustainability.
- **Exploitation Plan:**
 - Available as a component of the public deliverable of the project (D3.1) <https://cordis.europa.eu/project/id/101059900/results>
 - Available on project website <https://www.biobeo.eu/education-programme/>
 - Widely promoted throughout the project online and at events
 - <https://library.parenthelp.eu/missing-link-bioeconomy-manual-biobeo/>
- **Status of steps taken for exploitation (reporting category):** Pilot, demonstration or testing
- **Market maturity (reporting category):** Emerging: growing demand, scare supply
- **Ownership and Access:** Owned by the creators (FEE and IPA) and made available via open access.

Train-the-Trainer Manual – engaging stakeholders, especially parents and students, at various governance levels

- **Result Type:** LEARN (Learning and training, including learning modules and curricula).
- **Result format:** REPORT
- **Short description of high potential:** potential to change governance approaches and to fully engage the students, their parents and families in the implementation of education in bioeconomy.
- **Audience/Target Group:** Education/training organisation/learners

- **Further information:** This manual contains the full train-the-trainer and stakeholder training programme for empowerment and the engagement of all stakeholders in governance and implementation. The training focuses on the theory and practice of community and parental engagement as well as child participation. It includes self-directed learning elements that prepare trainers for delivering training, detailed descriptions of training activities with tips and practical ideas for organising and implementing the trainings. It is primarily designed to support peer-training and provides various materials for further reading and recommends further training options.
- **Exploitation Plan:**
 - Available as public deliverable of the project (D2.1)
<https://cordis.europa.eu/project/id/101059900/results>
 - Available on project website <https://www.biobeo.eu/education-programme/>
 - Widely promoted throughout the project online and at events
 - <https://library.parenthelp.eu/train-the-trainer-manual-biobeo/>
- **Status of steps taken for exploitation (reporting category):** Pilot, demonstration or testing
- **Market maturity (reporting category):** Emerging: growing demand, scarce supply
- **Ownership and Access:** Owned by the creators (IPA) and made available via open access.

Blueprint and Methodology for Innovative Governance

- **Result Type:** PO: Policy recommendation, guidance, awareness raising, advocacy.
- **Result format:** REPORT
- **Short description of high potential:** guidance for regulating how new content (especially bioeconomy) can be introduced into schools in different countries, and which models and conditions can be identified as the most favourable.
- **Audience/Target Group:** Policy-makers and authorities, national
- **Further information:** Create a common innovative governance structure, defining a blueprint for real citizen involvement in the bioeconomy. Outlines a society-wide governance framework for stakeholders to contribute to sustainable bioeconomies across Europe.
- **Exploitation Plan:**
 - Available as public deliverable of the project (D2.2)
<https://cordis.europa.eu/project/id/101059900/results>
 - Available on project website <https://www.biobeo.eu/curriculum-change/>
 - Available on: <https://library.parenthelp.eu/blueprint-and-methodology-for-innovative-governance-biobeo/>
 - Widely promoted throughout the project online and at events
- **Status of steps taken for exploitation (reporting category):** Pilot, demonstration or testing
- **Market maturity (reporting category):** Emerging: growing demand, scarce supply
- **Ownership and Access:** Owned by the creators (CASE) and made available via open access

Digital Handbook: Practical Paths for Introducing New Content into Schools

- **Result Type:** PO: Policy recommendation, guidance, awareness raising, advocacy.
- **Result format:** REPORT and DEC: Website navigation

- **Short description of high potential:** An online resource to empower educators to navigate existing education governance structures to facilitate innovative content introduction
- **Audience/Target Group:** Education/training organisation/learners
- **Further information:** Hosted on the BioBeo website (www.biobeo.eu), it provides information on actors, procedures, and barriers in education governance, complemented by relevant societal messages. Uses a flowchart design for navigation and includes links to internal and external resources.
- **Exploitation Plan:**
 - Available as public deliverable of the project (D2.4)
<https://cordis.europa.eu/project/id/101059900/results>
 - Available on project website <https://www.biobeo.eu/curriculum-change/>
 - Widely promoted throughout the project online and at events
- **Status of steps taken for exploitation (reporting category):** Pilot, demonstration or testing
- **Market maturity (reporting category):** Emerging: growing demand, scarce supply
- **Ownership and Access:** Owned by the creators (CASE) and made available via open access

Comic Series: "Finding Beo", "Back to the Future with Beo and Raja" and "Answering the Curlew's Call"

- **Result Type:** Other
- **Result format:** Comics
- **Short description of high potential:** Comics that make bioeconomy concepts accessible and engaging for younger audiences, emphasizing themes like sustainability, interconnectedness, and natural systems.
- **Audience/Target Group:** Education/training organisation/learners
- **Further information:**
 - "Finding Beo": was created just prior to the official start of the BioBeo project, so the characters and comic would be available for the launch event.
 - "Back to the Future with Beo and Raja" is the next in the series - with the subtitle "a tale from the early bioeconomy" and created in collaboration with the UCD School of Archaeology.
 - "Answering the Curlew's Call", endorsed by Curlew Action and featuring internationally renowned singer David Gray, focuses on the decline of the curlew bird and connects bioeconomy with language, heritage, and culture. English and Irish language colour versions are available. Black and white colouring book versions are also available online. A puppet show based on "Answering the Curlew's Call" teaches children about bioeconomy using bio-based puppets.
- **Exploitation Plan:**
 - All comics available on the UCD research repository:
 - Finding Beo <http://hdl.handle.net/10197/13251>
 - Back to the Future with Beo and Raja: <http://hdl.handle.net/10197/25436>
 - Answering the Curlew's Call: <http://hdl.handle.net/10197/27410>
 - Explanatory guidance notes and learning activities related to this comic are available from the same link
 - An animated video and puppet show version are also available:
 - [BioBeo: Answering the Curlew's Call. A Beo and Raja Adventure](#)

- [BioBeo: Answering the Curlew's Call: The Puppet Show](#)
 - Answering the Curlew's Call - links to comic, animation and puppet show on Breeding Waders EIP website (<https://breedingwaders.ie/resources/>) and promoted at events and in schools as part of the project's Educational Toolbox
 - All comics available on project website <https://www.biobeo.eu/meet-beo>
 - Widely promoted throughout the project online and at events
 - To date, over 2000 total downloads of the comic series have been recorded.
 - Printed for distribution at events and in schools
 - There are plans for further development, including potential TV company connections.
- **Status of steps taken for exploitation (reporting category):** Pilot, demonstration or testing; Intellectual property management
- **Market maturity (reporting category):** Emerging: growing demand, scarce supply
- **Ownership and Access:** Owned by the creators (UCD and MU) and made available via open access (creative commons licence CC BY-NC-ND)

BioBeo Songs

- **Result Type:** Other
- **Result format:** DEC: Songs with videos
- **Short description of high potential:** Creative songs marrying complex science, the bioeconomy concept, and the arts, making it transdisciplinary and appealing to communities.
- **Audience/Target Group:** Applicable to all.
- **Further information:**
 - The original BioBeo song was developed for use as part of the primary school programme and a sing along video was developed with Beo and friends.
 - An Talamh Bhláfar (The Fertile Land) is a song that bridges heritage, culture, and sustainability. Created by Maynooth University (MU) and University College Dublin (UCD) through the Horizon Europe BioBeo project and the BiOrbic BioCultúr project, it shares the significance of the bioeconomy with communities through the arts.
- **Exploitation Plan:**
 - Available on project website <https://www.biobeo.eu/further-resources/videos/>
 - Widely promoted throughout the project online and at events
- **Status of steps taken for exploitation (reporting category):** Pilot, demonstration or testing
- **Market maturity (reporting category):** Emerging: growing demand, scarce supply
- **Ownership and Access:** Owned by the creators (MU) and made available via open access

BioBeo App

- **Result Type:** LEARN: Learning and training (learning modules, curricula)
- **Result format:** DEC: mobile app, web-based app
- **Short description of high potential:** BioBeo app can be a digital infrastructure for creating different outdoor education solutions regarding bioeconomy by educators in different locations.

- **Audience/Target Group:** Applicable to all (In particular: Citizens and Education/training organisation/learners, Industry, business partners, End users (practitioners, farmers, etc))
- **Further information:** BioBeo App is an app that combines fun, learning, and adventure for young people, who love nature. With the BioBeo App, young people and kids can choose from different trail routes that are suitable for their age and location, using a geospatial navigation system that guides them. On each trail, they can explore the biodiversity and beauty of nature, answer quizzes about bioeconomy and earn badges. BioBeo App helps kids to understand how bioeconomy can benefit the environment and society, and how they can contribute to it. BioBeo App also helps kids stay safe by categorising the trail routes as child safe or adult supervision required. BioBeo App is not just an app, it is a fun and educational journey that sparks kids' curiosity and creativity about the natural world. The App was configured with 28 routes with bioeconomy quizzes, and is available for the educators to add more routes using the BioBeo Dashboard.
- **Exploitation Plan:**
 - Available as public deliverable of the project (D3.5)
<https://cordis.europa.eu/project/id/101059900/results>
 - Available on project website <https://www.biobeo.eu/further-resources/applications/>
 - Instructions and Demo videos available on the YouTube Channel:
<https://www.youtube.com/@BioBeoProject>
 - **Instructions:** [BioBeo App & Dashboard: How to create a route map!](#)
 - Demo video: <https://www.youtube.com/watch?v=JrSJwY-r9z0>
 - **App version for Android link:** [BioBeo Learning App - Apps on Google Play](#)
 - **App version for iOS link:** [BioBeo Learning App on the App Store](#)
 - **WebApp version link:** <https://app.biobeo.eu/>
 - Widely promoted throughout the project online and at events
 - Initial testing route set up in Brussels for the BioBeo Festival
 - Route set up in UCD for the UCD Festival, and ongoing tree walk route
 - Routes set up in all consortium countries (28 routes, 147 points of interest in total)
- **Status of steps taken for exploitation (reporting category):** Pilot, demonstration or testing
- **Market maturity (reporting category):** Emerging: growing demand, scarce supply
- **Ownership and Access:** Owned by the creators, YSBF and made available via free licences

BioBeo Animation Videos

- **Result Type:** Other
- **Result format:** DEC: videos
- **Short description of high potential:** The videos are a novel resource for all communities, introducing the bioeconomy concept through a transdisciplinary approach, integrating the arts and complex scientific content for viewers.
- **Audience/Target Group:** Applicable to all (In particular: Citizens and Education/training organisation/learners)
- **Further information:** The original set of animated videos produced by YSBF based on the characters of Beo, Raja and friends, and storyboards created by the BioBeo project:

- *Nature Detective Work in a Bioeconomy: Join Beo and her friends in the wild outdoors working as nature detectives and realising some unexpected facts!*
[Nature Detective Work in a Bioeconomy](#)
- *Organic Magic: Bioeconomy Explorers: Learn how organic wastes can be used by different organisms, and be processed to generate valuable resources!*
[Organic Magic: Bioeconomy Explorers](#)
- *Sustainable Fish in a Bioeconomy: Go shopping with Beo and learn about how fish are sustainably produced in aquaculture and aquaponics in cities!*
[Sustainable Fish in a Bioeconomy](#)
- *Sparkling Seas: A Bioeconomy Adventure: Follow Beo's adventure under the sea and see what she discovers!*
[Sparkling Seas: A Bioeconomy Adventure](#)
- *Bioeconomy in Fabulous Forests: Walk through a fabulous forest with Beo, learning about biodiversity and sustainability of wood-based products!*
[Bioeconomy in Fabulous Forests](#)
- *Further animated videos for the BioBeo song and the Curlew Comic were also created.*
- *Other BioBeo videos were also produced on a range of topics: Curlew puppet show, festival videos, BIP, eTwinning, introduction to bioeconomy, biogardens, Resource Don't Go boardgame, BioBeo App*
- **Exploitation Plan:**
 - Available as public deliverable of the project (D3.5)
<https://cordis.europa.eu/project/id/101059900/results>
 - Available on project website <https://www.biobeo.eu/further-resources/videos/>
 - Available on the YouTube Channel <https://www.youtube.com/@BioBeoProject>
 - Widely promoted throughout the project online and at events
 - As of April 1, 2025, the BioBeo App had recorded over 1,500 visitors. The app offers interactive trails and quizzes in 10 countries (all partner countries!). Its accompanying dashboard has been used to create 28 routes with 147 points of interest (POIs) and 418 questions, enhancing localized bioeconomy learning.
 - The project aims for the app to have a use beyond the end of the project, with partners considering further implementations in their countries for legacy.
- **Status of steps taken for exploitation (reporting category):** Pilot, demonstration or testing
- **Market maturity (reporting category):** Emerging: growing demand, scarce supply
- **Ownership and Access:** Owned by the creators and made available via open access

BioBeo XR Toolkit

- **Result Type:** PROD: Product (new or improved)/ SERV: Service (new or improved)/LEARN: Learning and training (learning modules, curricula)
- **Result format:** DEC (Websites, patent filings, videos, etc.).
- **Short description of high potential:** Designed to open minds, unleash the imagination, spark ideas, inspire solutions and increase the sense of personal responsibility and accountability for the future of our world and humanity. The XR immersion empowers learners to view issues of

the circular bioeconomy from a range of different perspectives, increasing empathy and understanding of people and our shared planet.

- **Audience/Target Group:** Applicable to all (In particular: Education/training organisation/learners, Citizens, Researchers, Policy-makers and authorities); use of the VR headsets are recommended for learners over 10 years old unless accompanied by an adult.
- **Further information:**
 - **Be Earth Number 13:** the original fully immersive VR experience by Dr Ylva Hansdotter of SMARTlab and XR Impact, mixes art and technology, digital and physical, in a number of experiences engaging participants directly in the UN Sustainable Development Goals. The Virtual Reality platform is building experiences in support of each of the 17 goals – starting with #13: A VR experience for Climate Action: Be Earth VR. For the Biobeo project, the full VR was re-coded for use on the untethered Quest Headset and also for playing with no headset from a computer screen in 360vr format. This enables inclusive access to a wider age range of participants, from any low-tech environment as well.
 - **Bee Hotel:** Build your own Insect Hotel XR Experience was specifically developed for the BioBeo project by VR artist and researcher Sara Lisa Vogl, for use on the untethered Quest Headset with hand controllers, allowing participants to view information and interact with the virtual environment to create a virtual bee hotel, learning about the skills of physical coordination needed to build the structure whilst also learning about the importance of bees to our ecosystem through the learning materials posted in the XR environment. A video version was also created for playing with no headset to further increase access.
 - Other lower-technology relevant XR tools were also produced for BioBeo and/or were made available through the online toolkit and demonstrated at events; these include:
 - i. Mindscape VR 360 by Dr Zi Siang See: a non-traditional tour encouraging learners to take control of the screen, as a novel research output creative work demo (VR360 2024);
 - ii. Nature: Cataract Gorge by Dr Zi Siang See: A VR360 exploration of a Forest, Nature, Wilderness and Interconnectedness including interviews with Indigenous citizens: Cataract Gorge, Launceston, Tasmania, 2024. (360vr)
 - iii. Food Loop vlog: Howard, David, Zi. Tasmania, 2024. (360vr)
 - iv. EcoTelly Augmented Reality TV interactive learning experience created by Vinny Hyland of Wild Derrynane: experience allowing you to explore underwater marine life using your mobile device. Encounters with little-seen underwater species are told as stories (recorded by Hyland underwater in County Kerry, Ireland) and are visualised through the use of an AR triggered video and audio app. Build your own ecoTELLY was demonstrated at the BioBeo Festival in 2024, and at the Brussels and UCD Festivals in 2-25. At a workshop, participants build their own “TV” from printed cardboard templates. These are cut out and folded into 3 dimensional cubes. In this first series, you interact with the underwater marine life of the Greater Skellig Coast along Ireland's Wild Atlantic Way. Across 3 channels, there are 9 interactions to explore. Learners come to understand that XR learning can be light, portable and personalisable.
 - v. The VR experiences were also augmented by sharing the UNESCO-award

winning World Sensorium Scent with participants, by Dr. Gayil Nalls. Her OCEAN film was also featured at all three festivals, along with her new botanical OCEAN scent.

- vi. SMARTlab also created a version of the BioBeo comic animated with voice actors and a new recording of the BioBeo song by Irish worldband Kíla (2024); the animations were triggered by QR code to show the very basic level of XR that learners can make and use themselves. This was featured at the BioBeo Festival in Brussels (2024).
- vii. A novel app for smartphone was also created and demonstrated at the Biobeeo Festival in 2024: Ultra-high processed food detector scans the information on food labels and gives instant advice on healthier eating: created by Jose Marinez.

- **Exploitation Plan:**

- Available on project website <https://www.biobeeo.eu/xr-tools/>
- Widely promoted throughout the project online and at events
- Available as public deliverable of the project (D3.2) <https://cordis.europa.eu/project/id/101059900/results>
- Many of the experiences transformed into 360 videos for the widest accessibility
- Some require just basic smart phones, an app and a make-at-home paper cube
- At public engagement events, Be earth and Bee hotel can be set up for demonstration with VR headset (untethered Quest Headset).
- Be Earth and Bee Hotel can be viewed interactively with no headset from a computer screen in 360vr format. This enables inclusive access to a wider age range of participants, from any low-tech environment as well.

- **Status of steps taken for exploitation (reporting category):** Pilot, demonstration or testing
- **Market maturity (reporting category):** Emerging: growing demand, scarce supply of novel XR experiences available for learners for free
- **Ownership and Access:** Owned by the creators (SMARTlab at UCD for BioBeo) and made available through the XR Toolkit on the BioBeo website. Full VR experiences are also downloadable for play at home with VR headsets.

BioBeo Bioeconomy Festival – and comprehensive guide on organising a sustainable event promoting bioeconomy

- **Result Type:** EVNT (Event, conference, seminar, workshop, etc.).
- **Result format:** Festival and Report with guidelines
- **Short description of high potential:** Could be held again and a comprehensive guide on organising a sustainable event promoting bioeconomy is available, heightening awareness of the environmental, social, and economic benefits of a sustainable and circular bioeconomy.
- **Audience/Target Group:** Applicable to all (In particular: Youth, educators, and policymakers).
- **Further information:** The festival, which took place in March 2024, included a fair with booths addressing the five BioBeo themes (interconnectedness, outdoor learning, forestry, life below water,

and the food loop), and workshops on circularity and sustainability. It showcased various project outputs, including the BioBeo App, VR/AR tools, and educational programmes. The event had 140 participants registered, including 70 students.

- **Exploitation Plan:**
 - Promotion of original event through BioBeo's website, social media, and partner networks.
 - A comprehensive guide on organising a sustainable event promoting bioeconomy was produced as a public deliverable (D3.4) <https://cordis.europa.eu/project/id/101059900/results>
 - and available on our website <https://www.biobeo.eu/festival/>
 - Available on <https://library.parenthelp.eu/d3-4-biobeo-comprehensive-guide-on-organising-a-sustainable-event-promoting-bioeconomy/>
 - Integration of festival content and themes into ongoing educational programmes and public outreach efforts.
- **Status of steps taken for exploitation (reporting category):** Pilot, demonstration or testing
- **Market maturity (reporting category):** Emerging: growing demand, scarce supply
- **Ownership and Access:** Collaborative activity by BioBeo partners, with lead Odisee; outputs made available via open access.

Bioeconomy Activity in Global Action Days

- **Result Type:** EVNT: Event (conference, seminar, workshop...)
- **Result format:** Event/Campaign
- **Short description of high potential:** A repeatable model for raising widespread awareness about the bioeconomy in daily lives, reaching a large international audience.
- **Audience/Target Group:** Applicable to all (In particular: Citizens and Education/training organisation/learners)
- **Further information:** Part of FEE's annual Global Action Days campaign
 - 2024 campaign: one of the five activities focused on the bioeconomy, highlighting BioBeo as a partner. Participants were asked to find and photograph examples of bioeconomy-linked products in their schools, homes, or clubs. The campaign registered 376,259 participants in over 30 countries in 2024, and 70,000 participants did the BioBeo/bioeconomy activity ("Climate Ready through Bioeconomy". <https://www.fee.global/global-action-days-2024>).
 - 2025 campaign: the theme for Global Action Days is ecosystem restoration. Once again, FEE is partnering with BioBeo on Activity 3 which explores bioeconomy through an intergenerational lens, asking participants to connect with elders in their community and learn about traditional practices related to agriculture, food preservation, or natural resources which fall under the bioeconomy <https://www.fee.global/global-action-days-2025>. Over 670,000 participants are joining from around the world.
 - **Exploitation Plan:**
 - Continued integration into FEE's annual Global Action Days campaign to consistently raise awareness.
 - Promotion through FEE's extensive global network and BioBeo's communication channels.

- Development of new themed activities within future GADs that further explore bioeconomy concepts.
- **Status of steps taken for exploitation (reporting category):** Pilot, demonstration or testing
- **Market maturity (reporting category):** Emerging: growing demand, scarce supply
- **Ownership and Access:** Collaborative activity with FEE, outputs made available via open access.

Resource – Don't Go! Boardgame

- **Result Type:** PROD: Product (new or improved)
- **Result format:** Boardgame (physical and digital PDF)
- **Short description of high potential:** innovative educational tool that introduces complex science and bioeconomy concepts through a pedagogy of play for all participants. It is designed to teach sustainability and resource management in an engaging and interactive manner.
- **Audience/Target Group:** Applicable to all, In particular: Young people (pre-school, primary, secondary, third level), teachers, parents, guardians, extended family, schools, community groups, researchers.
- **Further information:** The board game Resource Don't Go! was developed by international students as part of a summer school on the topic "How is bioeconomy going to shape our world?" at the University of Hohenheim in order to give interested parties playful insights into the possibilities and challenges of a sustainable and circular bioeconomy. The game is suitable for use in schools as well as at universities. The learners can create playing cards themselves and present them to the other players. The game can thus be used in various courses that deal with the topic of bioeconomy. Special editions of the game include:
 - A "Parental Engagement Edition" with a new set of playing cards focused on parental engagement, accompanied by a 1-hour video course.
 - A "Cross Fertilisation Edition" featuring playing cards that integrate findings and discussion inputs from nine other EU-funded projects (Hoop Project, Circalgae, GenB, CEE2ACT, REDWINE, Phenolexa Project, Lowinfood, VIVALDI, and the NeoGIANT Project), as well as LENA school.
 - The game is designed to integrate with multiple Sustainable Development Goals (SDGs 7, 10, 11, 12, 13) and supports interdisciplinary curriculum integration. Its effectiveness has been assessed through questionnaires administered to students before and after gameplay.
- **Exploitation Plan:**
 - Distribution and promotion to schools, universities, and community groups for interactive learning.
 - Continued integration into teacher training courses and educational events.
 - Promotion for use in classrooms and homes to engage readers across age ranges.
 - Distribution through digital platforms and educational networks.
 - Available for free download on the project website: <https://www.biobeo.eu/boardgame> and a video explaining the game is available here too
 - It has been extensively utilized in an 8-month eTwinning project (October 2023 - June 2024), involving primary and secondary schools across four countries (Greece, Turkey, Romania,

Sweden) and five different schools, fostering collaborative learning and cross-cultural cooperation

- Languages: German and English
- **Status of steps taken for exploitation (reporting category):** Pilot, demonstration or testing; Intellectual property management
- **Market maturity (reporting category):** Emerging: growing demand, scarce supply
- **Ownership and Access:** Single-owned by Universitaet Hohenheim (Germany) and available via open access.

Choco Chase Boardgame

- **Result Type:** PROD: Product (new or improved)
- **Result format:** boardgame
- **Short description of high potential:** to teach circular bioeconomy and sustainability concepts through the process of chocolate-making, promoting systems thinking and sustainability. Its core aim is to make these complex topics accessible and engaging.
- **Audience/Target Group:** Education/training organisation/learners
- **Further information:** The initial piloting of the draft game took place at the Ceardlann Oideachais: BioBeo and BiOrbic Bioeconomy Education Workshop on February 20, 2025. The game was subsequently trialled during the Bioeconomy Elective Module in MU. Qualitative feedback from piloting sessions has been consistently positive, and educators have expressed interest in piloting the game in their classrooms, requesting digital and printable versions for wider testing.
- **Exploitation Plan:**
 - An overview will be presented at the 2GGS: 2nd Geogames Symposium 2025: Connecting Communities through Games and Play in University College Dublin in June 2025
 - Avenues for exploitation are still being explored
- **Status of steps taken for exploitation (reporting category):** Pilot, demonstration or testing
- **Market maturity (reporting category):** Market creating: not existing but potential for the creation of a new market
- **Ownership and Access:** Owned by the creators and avenues for exploitation are still being explored

BioBeo Teachers' Manual - How To Grow Mushrooms

- **Result Type:** LEARN: Learning and training (learning modules, curricula)
- **Result format:** Manual downloadable as pdf, OER
- **Short description of high potential:** to teach circular bioeconomy and sustainability concepts through the process of growing mushrooms on spent coffee grounds, promoting systems thinking and sustainability. Its core aim is to make these complex topics accessible and engaging.
- **Audience/Target Group:** Education/training organisation/teachers/ learners
- **Further information:** This manual gives guidance to teachers on how to grow mushrooms on coffee grounds in class and equips them with the tools to teach and apply sustainable development

principles in the daily lives of their students. With the help of background information, clear instructions and information on trouble-shooting, recipes, work sheets, and exemplary lesson plans, this classroom project is easily implemented in class and encourages critical thinking about how we can close material loops, reduce waste, and create resilient food systems for the future. It empowers educators to introduce students to practical, hands-on sustainability practices while enhancing their understanding of vital environmental concepts. By using spent coffee grounds—a common waste product—as a growing medium, this manual promotes the idea of closing food loops. Students will learn how organic waste can be repurposed, contributing to circular economies and reducing food waste. The hands-on experience fosters deeper engagement with the principles of sustainability, food production and nutrition, waste reduction, and resource conservation.

- **Exploitation Plan:**
 - Available on project website <https://www.biobeo.eu/further-materials/>
 - Widely promoted throughout the project online and at events, e.g. on the FOOD2030 Science Education toolkit of Cleverfood (https://food2030.eu/education_toolkit/bioeconomy-teaching-package/?goal=124)
 - https://www.static.tu.berlin/fileadmin/www/10002031/Projekte/ManualMushroom_BioBeo_final.pdf
 - Available as a component of the public deliverable of the project (D3.1) <https://cordis.europa.eu/project/id/101059900/results>
- **Status of steps taken for exploitation (reporting category):** Pilot, demonstration or testing
- **Market maturity (reporting category):** Emerging: growing demand, scarce supply
- **Ownership and Access:** Owned by the creators (IPA) and made available via open access.

BioBeo Gender Action Plan

- **Result Type:** PO: Policy recommendation, guidance, awareness raising, advocacy
- **Result format:** Deliverable D1.1 report
- **Short description of high potential:** Promotes gender equity and inclusivity across all genders and backgrounds in bioeconomy education and careers, fostering a diverse workforce, breaking stereotypes, and applying universal design principles
- **Audience/Target Group:** Education/training organisation/teachers/ learners, Researchers, EU institutions and/or agencies, Policy-makers and authorities at local, national and international levels
- **Further information:** The BioBeo Gender Action Plan (GAP), led by IPA, aims to enhance societal understanding and engagement in the circular bioeconomy by addressing social issues like gender bias and supporting disadvantaged youth, migrants, and individuals with additional needs. It specifically inspires future citizens in STE(A)M (Science, Technology, Engineering, Arts, and Mathematics) careers, focusing on gender balance and diverse backgrounds. The GAP adopts a Universal Design for Learning (UDL) approach, providing a framework for inclusive education and career development, and is monitored by a dedicated Gender Action Officer.
- **Exploitation Plan:**
 - Available as public deliverable of the project (D1.2) <https://cordis.europa.eu/project/id/101059900/results>
- **Status of steps taken for exploitation (reporting category):** Pilot, demonstration or testing
- **Market maturity (reporting category):** Emerging: growing demand, scarce supply

- **Ownership and Access:** Owned by the creators (IPA) and made available via open access.

3. Sustaining BioBeo's Legacy

The BioBeo project has focused on ensuring a lasting legacy by developing and fostering key initiatives that will continue to operate beyond the project's official conclusion. This includes the continuation of the Bioeconomy Matters podcast, the BioBuzz newsletter, and the Bioeconomy Education and Sustainability Teachers (BEST) Network, all supported by BiOrbic and other strategic collaborations.

The BioBeo project has actively sought and successfully secured or laid the groundwork for additional funding and collaborations at national and EU levels to extend its impact.

Further Funding:

The success of BioBeo has directly led to further funding from BiOrbic (Ireland's National Bioeconomy Research Centre, <https://biorbic.com>) for education and public engagement initiatives in Ireland. In addition to some of the items mentioned below, work is already underway on another comic featuring Beo and Raja!

BioBeo also served as an inspiration for the METEOR project: Methodologies for Teamworking in Eco-Outwards Research (<https://www.meteorhorizon.eu/>), which secured funding in 2024 under the Horizon Europe Coordination and Support Action. The collaboration continues between Peter Gray (BioBeo Advisory Board), SYNNO, and CASE (WP2 coordinators in BioBeo, project leaders in METEOR). The project aims to enhance the transversal skills of postgraduates and early-career researchers. Aligned with the principles of open science and responsible research and innovation, and grounded in the UN Sustainable Development Goals, METEOR focuses on fostering collaboration and interdisciplinary projects to address societal challenges and strengthen doctoral career opportunities.

Bioeconomy Matters Podcast:

This podcast <https://www.biobeo.eu/bioeconomy-podcast/>, hosted by Rita Escórcio and Hailey Ciantar (former EU Bioeconomy Youth Ambassadors), and supported by BioBeo, has been a valuable platform for describing the BioBeo project and explaining various aspects of the bioeconomy. Project coordinator Dr. Tom Curran and other consortium members have appeared on the podcast, which has already produced over 30 episodes. To ensure its longevity, the "Bioeconomy Matters" podcast will continue to be sponsored by the BiOrbic Irish Centre for Bioeconomy until 2029. This sponsorship specifically covers the yearly Zoom subscription for the podcast and includes ongoing suggestions for promoting the podcast and securing new interviews.

BioBuzz Newsletter:

This monthly newsletter is your ticket to eco-fun in your community, suitable for curious minds from primary to university levels! Prepare for a great buzz filled with jokes, news, and engaging activities for the whole community: <https://www.biobeo.eu/biobeo-buzz-newsletter/>. Originally launched as "BioBeo Buzz" in March 2024, the newsletter was rebranded to "BioBuzz" in March 2025 to signify its continuation beyond the BioBeo project, but will continue to be hosted on a listserv list. This rebranding also incorporates outputs from BiOrbic. Co-created by An Taisce, Maynooth University (MU), and University College Dublin (UCD), the newsletter has published 11 editions during the project's lifespan, gathering valuable content such as bioeconomy teaching inputs, jokes, activities, news, and career profiles. By April 2025, BioBuzz had 345 subscribers. Its continued publication is a crucial legacy piece,

acting as an ongoing communication tool, especially for the Bioeconomy Education and Sustainability Teachers (BEST) Network.

Bioeconomy Education and Sustainability Teachers (BEST) Network:

Launched officially in March 2025 through the BioBuzz newsletter, the BEST network is a community of bioeconomy and sustainability educators that will continue to foster communication and shared best practices. Its steering committee comprises members from key partnering institutions, including University College Dublin, Maynooth University, Rotterdam University of Applied Sciences, and Odisee University of Applied Sciences, ensuring continued growth and collaboration. The network is designed to be inclusive, with automatic membership for anyone who signs up for the BioBuzz newsletter. The BEST network plans to host annual meetings for educators to share research and insights, extending the project's collaborative efforts. It currently boasts over 400 members and aims to reach 1,000 members by December 2025. Educators involved in the BioBeo Blended Intensive Programmes will serve on the steering committee, actively recruiting new members from BioBeo electives and future intensive programmes, thus ensuring long-term collaboration and dissemination of bioeconomy content in educational settings. The network also integrates career profiles and insights into bioeconomy professions through its dedicated section in the BioBuzz newsletter. <https://www.biobeo.eu/2025/04/09/bioeconomy-education-and-sustainability-teachers-best-network/>

Website Sustainability:

While the project website <https://www.biobeo.eu/> is guaranteed to be hosted for three more years after the project's end, discussions are ongoing to maintain it for an even longer period (five to seven years), exploring options with SYNYO and YSBF to ensure continued access to resources. The website has been updated to be an extensive repository of resources for educators, students, and other stakeholders.

Academic Publications:

Ongoing work includes several peer-reviewed publications and book chapters, some of which emphasize the social and economic aspects of the bioeconomy, further disseminating the project's findings and ensuring its academic legacy.

Curriculum Integration:

BioBeo has made significant strides in influencing educational curricula, with bioeconomy concepts now integrated into secondary school curricula in the Netherlands (specifically in Biology, Geography, and Economics) and forming the foundation of two new circular economy-focused schools in Germany. The integration of BioBeo themes into university curricula is also ongoing in Ireland, the Netherlands, Germany, Belgium, and Greece.

At the same time, partners are including elements of the advocacy and methodological training in pre-service and in-service teacher training curricula (Ireland, Netherlands, Lithuania, and through Erasmus+ teacher exchange).

Pilot Schools:

BioBeo will live on through LENA (Lebendige Naturschule), Germany's first nationwide bioeconomy pilot primary school, which opened in September 2024, and NISA school, another new institution focusing on Circular Economy and Circular Literacy with a STEM emphasis. NISA has received official recognition and has a direct agreement with UH to implement BioBeo project results until 2027 and beyond.

Bioeconomy Career Development:

The BioBeo project has significantly inspired bioeconomy career development by adopting a comprehensive approach that integrates diverse educational activities and events, skill development, and strong industry and policy collaborations. This initiative has focused on inspiring individuals across various age groups, from introducing foundational computational skills and ethical discussions to educators and policy makers, to engaging school and college students in hands-on learning experiences directly linking STEM concepts with real-world bioeconomy challenges.

A variety of impactful events were organized by different partners to achieve these goals. For instance, **E3STEM** conducted workshops like "STEM and Bioeconomy in Action - The BioBeo Project" for college students, the "BioBeo STEM Bioeconomy Workshop" at the Athens Science Festival for secondary school students, and a hybrid lecture event titled "Bioeconomy and Artificial Intelligence in Education" featuring three bioeconomy key note speeches on sustainable development and circular bioeconomy, followed by a round table discussion with scientists, business representatives, and educational policymakers on AI's contribution to sustainability and bioeconomy career development. An Taisce organized career events, including presentations at a secondary school careers fair in Dublin and webinars like "Careers in Biodiversity" and "Sustainable Businesses," featuring professionals discussing their roles and offering career advice. **Odisee University of Applied Sciences (OUAS)** focused on secondary-level students, promoting knowledge of sustainable economic development and entrepreneurship through their BioBeo Education Programme and by organizing the BioBeo Festival in Brussels, which included the launch of the BioBeo App, workshops on composting and circular prototyping, and presentations by organizations like EcoStain. **University of Hohenheim (UH)** spearheaded an event at the German Federal Ministry of Education and Research showcasing study programmes and career opportunities across various bioeconomy sectors. UH and UCD both gave a presentation at a high-level workshop of the European Commission on Bioeconomy Education, emphasizing early bioeconomy education. Several partners were involved in the BISC-E Challenge in their own countries (e.g. UH and MU), an entrepreneurship competition for students focused on bioeconomy business ideas. Furthermore, UCD supported the "Bioeconomy Matters" podcast, offering insights into career pathways.

In conclusion, the BioBeo project's diverse range of events, encompassing interactive workshops, engaging games, practical experiments, informative speeches, and insightful round table discussions, effectively showcased the diverse nature of the bioeconomy and its career opportunities to educators, students and policymakers across Europe. By presenting concrete examples of sustainable practices, technological innovations, and entrepreneurial ventures within the bioeconomy—from beekeeping and smart food systems to bioplastics, ocean monitoring, and satellite-based agriculture—the project aimed to inspire and equip the next generation to pursue rewarding careers in this critical sector and contribute to a sustainable future.

4. IPR Management

4.1 General Introduction to Intellectual Property Rights (IPR)

In the broadest sense, intellectual property (IP) refers to different types of intangible expressions (such as artistic and literary work, discoveries and inventions, words, symbols and designs) for which specific monopoly

rights are recognised under specific laws. Under such intellectual property laws, the owners of such intangible expressions are granted some exclusive rights that typically exclude others from using them without the owner's consent. The main types of IPR include patents, copyrights, trademarks, industrial design rights and trade secrets.

Each consortium member will work with their internal commercial team, exploitation manager or equivalent to ensure that they obtain correct advice on disclosed IP, protection and exploitation. The Project Coordinator will ensure that the appropriate Horizon 2020 reference documents and contact details of IPR helpdesk are circulated to all partners (service@iprhelppdesk.eu). In addition, the IPR Helpdesk will be consulted at the end of the project regarding the appropriate upload of results to the Horizon Results Platform (<https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/horizon-results-platform>).

The project will fully follow the rules set out by the EC in terms of IP.

- “Background”, which is partners’ know-how pre-existing the project, while remaining the sole property of their owners, will be made available to the other partners as needed for the fulfilment of the project.
- “Foreground”, which is developed by the partners during the project, will be owned by the partners who have directly contributed to its creation, either alone or jointly with other partners. In case of joint ownership, a separate contract (co-ownership agreement) will be drawn up and signed by the owners to determine their rights and obligations, and settle the IP management and exploitation rules.
- Traceability of background and foreground will be sought throughout the project. The project will generate a constant flux of foreground between the partners, and each partner’s contribution to the Foreground will be one part of the data which will be recorded.
- All publications and communications in connection with the Knowledge resulting from the project shall be reviewed to identify knowledge that could be the subject matter of protection. Afterwards, dissemination of knowledge stemming from the project will follow a two-fold process.
 - Fundamental scientific results that cannot be patented will be freely disseminated through different channels: scientific publications, presentations at international conferences and workshops, etc. All partners have agreed to mention the project and the funding of the project by EC in all presentations and publications related to the project.
 - For all results generating IP, the partners will actively seek to protect all exploitable knowledge such as patent searches, filing and prosecution of patent (or other IPR) applications. The protection of “foreground” as well as associated exploitation strategy will be regularly reviewed by the WP leaders and Deputies.

The IP management plan will provide a framework for innovation capacity building measures, and assure IP training and update of competences, provide expertise on IP issues, and ensure organisation of the IP including networking with partnering entities for co-exploitation of results.

4.2 Summary of IPR in BioBeo

The main outputs, including any Key Exploitable Results, are mostly **copyrights** associated with a range of works. Such works include copyrights in software for animated videos and Virtual Reality/Augmented Reality

applications and website content, and copyrights in other materials such as brochures and marketing materials, books and reports as well as internal written materials. There are also copyrights in cartoon characters.

Trademarks: “BioBeo” does not appear to currently be a registered trademark, and an initial search of the Irish Patents Office website did not reveal any patents using this name. There are no current plans to register “BioBeo” as a trademark. Further, there is the possibility of applying for **trademarks** with certain colours associated with certain bioeconomy themes, however this is not currently envisaged.

In keeping with the aims of the projects, most KERs that are copyrighted materials are disseminated openly, with decisions made on what type of licence or mechanism will be used. Creative Commons (CC) licences will provide a central mechanism for widely disseminating educational materials. The creators determine what CC licences are used (CC0, CC BY, CC NC, CC ND and various combinations of these) and what copyrighted works should not be widely disseminated for the potential to be **exploited**.

The treatment of IPR is governed by the Consortium Agreement and the Grant Agreement, with the most relevant sections copied as Annexes to this Deliverable for reference.

The project is producing novel and significant outcomes which are of European importance hence the need to consider full exploitation of IPR. It is important to the partners that the long-term sustainability strategy will facilitate the extended use of outputs, and the development of future research and follow-on projects.

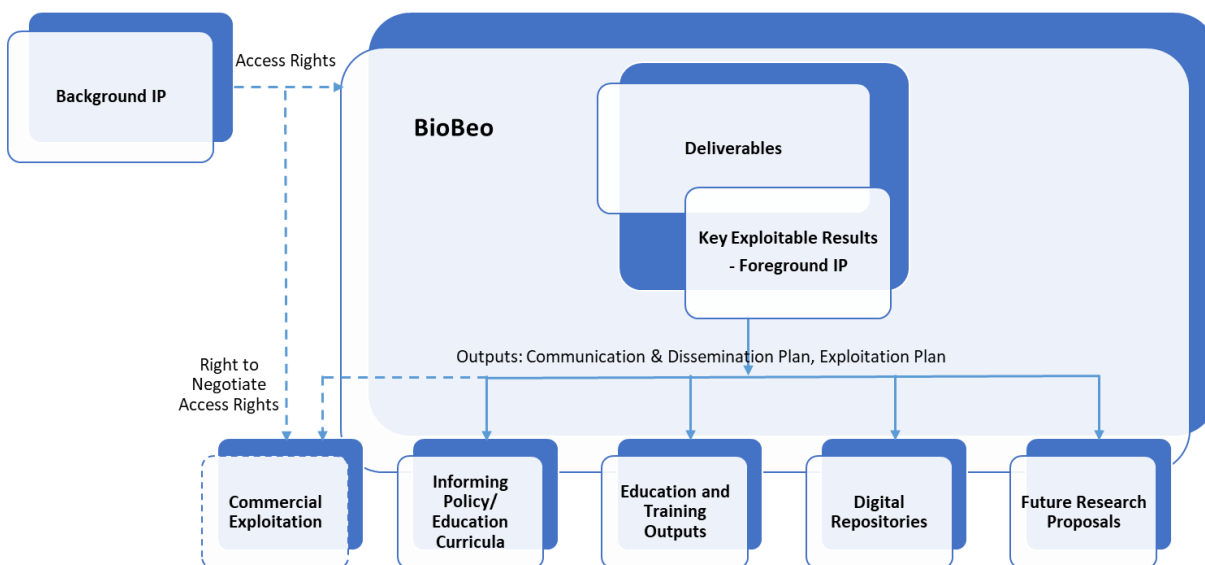


Figure 1 Exploitation Plan IP Flow Chart

As per the Dissemination and Communication Plan (Deliverable 4.1) most outputs including will be made available to the key stakeholders and the public for maximum impact. Through completion of WP4 activities, the transfer of foreground knowledge may be assisted through hosting or presenting at targeted events, for example training events and the BioBeo Bioeconomy Festival. It is envisaged that this work will demonstrate

the wider potential of BioBeo Education programmes. Sample novel toolkits will act as a key enabler for wider stakeholders to mobilise resources to raise the profile of the importance of the bioeconomy.

4.3 IPR Risk

In the foreseen risks listed in the Description of Action, Intellectual Property Risk is mentioned in relation to Deliverables potentially infringing on IPR (as well as the potential for not being well focussed or well drafted), with the proposed mitigation measure of establishing a Quality Control Group to review all deliverables before final submission. This Management Team consisting of the WP Leaders and Deputies fulfils this role.

Table 1 IPR-related Risk and Proposed Mitigation Measures (taken from List of Critical Risks in the Description of Action)

| Risk No. | Description | Work Package No.(s) | Proposed Mitigation Measures |
|----------|---|---------------------|---|
| 5 | Deliverables are not focussed, well drafted or infringe IPR | WP3, WP1, WP2, WP4 | Quality Control Group established to review all deliverable before final submission |