



NATURAL
CAPITAL
IRELAND

**TEACHING NATURAL
CAPITAL & ECOSYSTEM
SERVICES APPROACHES
IN HIGHER EDUCATION
INSTITUTIONS IN IRELAND**

Report Name: Teaching Natural Capital & Ecosystem Services approaches in Higher Education Institutions in Ireland: Natural Capital Ireland Report on Survey Results.

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Suggested Citation: Flood, K., Smith, F. and Blanchfield A. (2022) Teaching Natural Capital & Ecosystem Services approaches in Higher Education Institutions in Ireland: Natural Capital Ireland Report on Survey Results.

Natural Capital Ireland Report Series, Number 1.

Photo: Irish Peatlands Postgraduate Group at Girley Bog NHA/SAC (Photo Credit: Marine Valmier)



From late 2020 to early 2021, Natural Capital Ireland issued a survey to our membership and through our social media networks to gather data on how third level institutions in Ireland are integrating natural capital and ecosystem services* concepts and approaches into curricula. Due to the growing importance of these concepts in international policy, Natural Capital Ireland is working to further their development in Ireland.

Through this and further research, we hope to better understand the uptake of these topics across key disciplines, as well as gain insight into the challenges and benefits of teaching these approaches. The findings will be used to inform work to advance the understanding and promote the application of natural capital concepts in Ireland, including the provision of expert speakers from our organisation, developing educational materials on the subject and offering assistance to institutions to incorporate and develop curricula on natural capital and ecosystem services topics.*

***Natural capital** is all the earth's resources such as plants, animals, minerals as assets or stocks that yield a flow of benefits to people.

An **ecosystem** is made up of all the organisms living in a community, and also the non-living elements with which they interact.

Ecosystem services are outputs from the above that benefit human wellbeing, ie Provisioning Services such as food and water, Regulating Services such as climate and pollination; Supporting Services such as soil nutrient cycling and Cultural Services such as educational, aesthetic and cultural heritage including recreation and tourism.

Summary

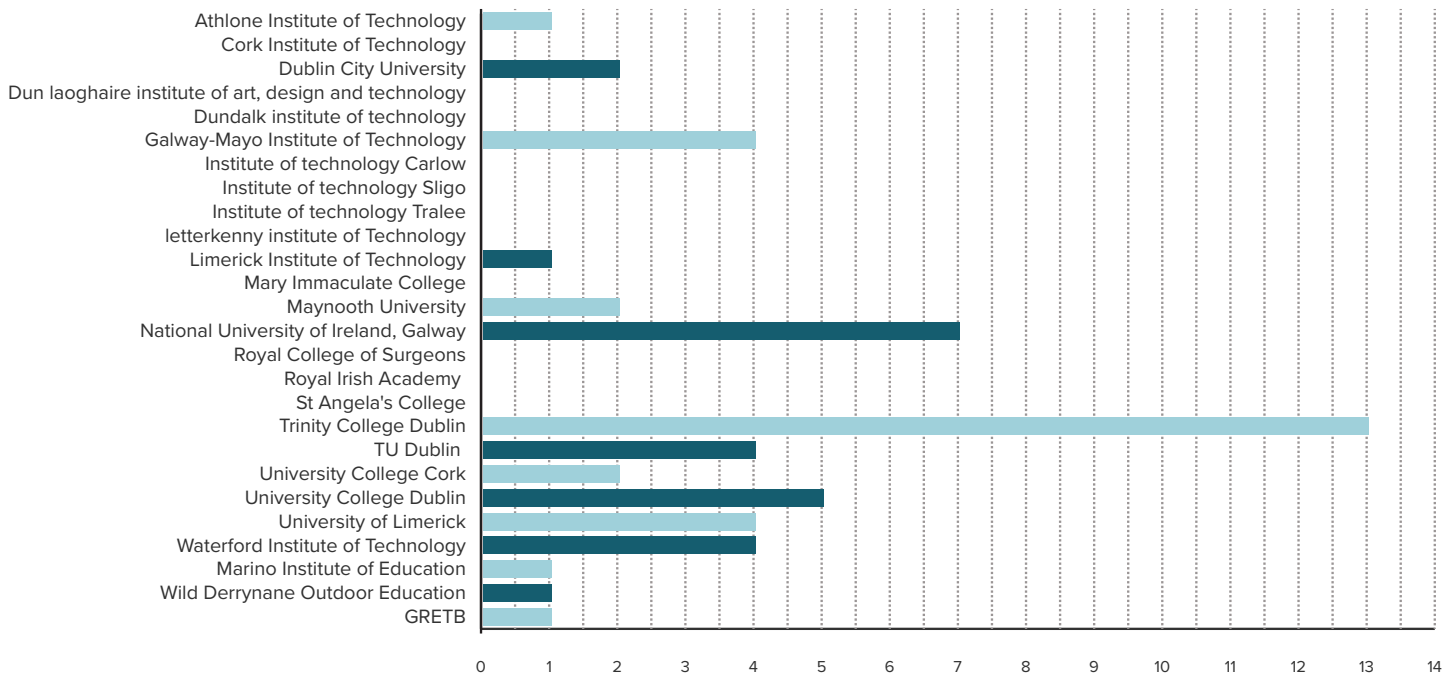
- Overall, the survey reveals a strong interest in teaching Natural Capital & Ecosystem Services approaches at third level.
- The variety of modules featured highlights the interdisciplinary nature of the topic.
- Challenges include the terminology, complexity and newness of the concept and the fact that there are few case studies and practical examples available. This means the relevance of the topic and how it can be applied is not always evident or easily understood.
- Benefits include giving students new perspectives on ecosystems and economics, awareness-raising & engagement of students, and improved knowledge and understanding of sustainability and the interconnectedness of economy, society and environment.
- There is a need for resources to be developed for teaching these subjects for example, online, videos, graphics, and case studies, at both undergraduate and postgraduate levels.

Methodology

An online survey titled “Teaching Natural Capital & Ecosystem Services approaches in Higher Education Institutions in Ireland” was conducted from November 2020 to April 2021. The survey was distributed through multiple channels including: the NCI newsletter; NCI social media; published on the NCI website; and shared directly via email to HEI departments in all major universities and Institutes of Technology. The survey received 51 responses from lecturers and researchers at a variety of higher education institutions around Ireland. The survey received 30 open-ended responses which were analysed through thematic analysis to identify and analyse patterns/themes within the data. (NOTE: It is likely the survey obtained a greater volume of responses from certain institutions & subject areas due to NCI & the surveyor’s connections with these.)

Summary of survey results

Please state your Higher Education Institution affiliation:





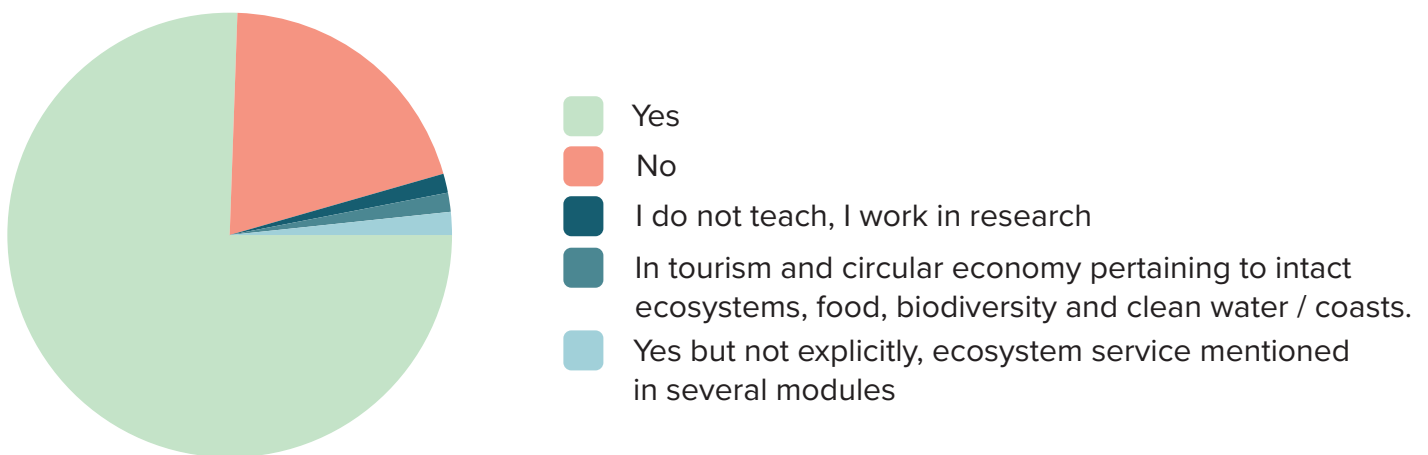
Results of the survey show that the approach is being taught in a wide variety of disciplines and departments but predominantly in Natural Sciences, Geography, and Engineering/Technology disciplines which account for 55% of responses (Table 1).

Table 1: *Which of the following best describes your department / area of expertise?*

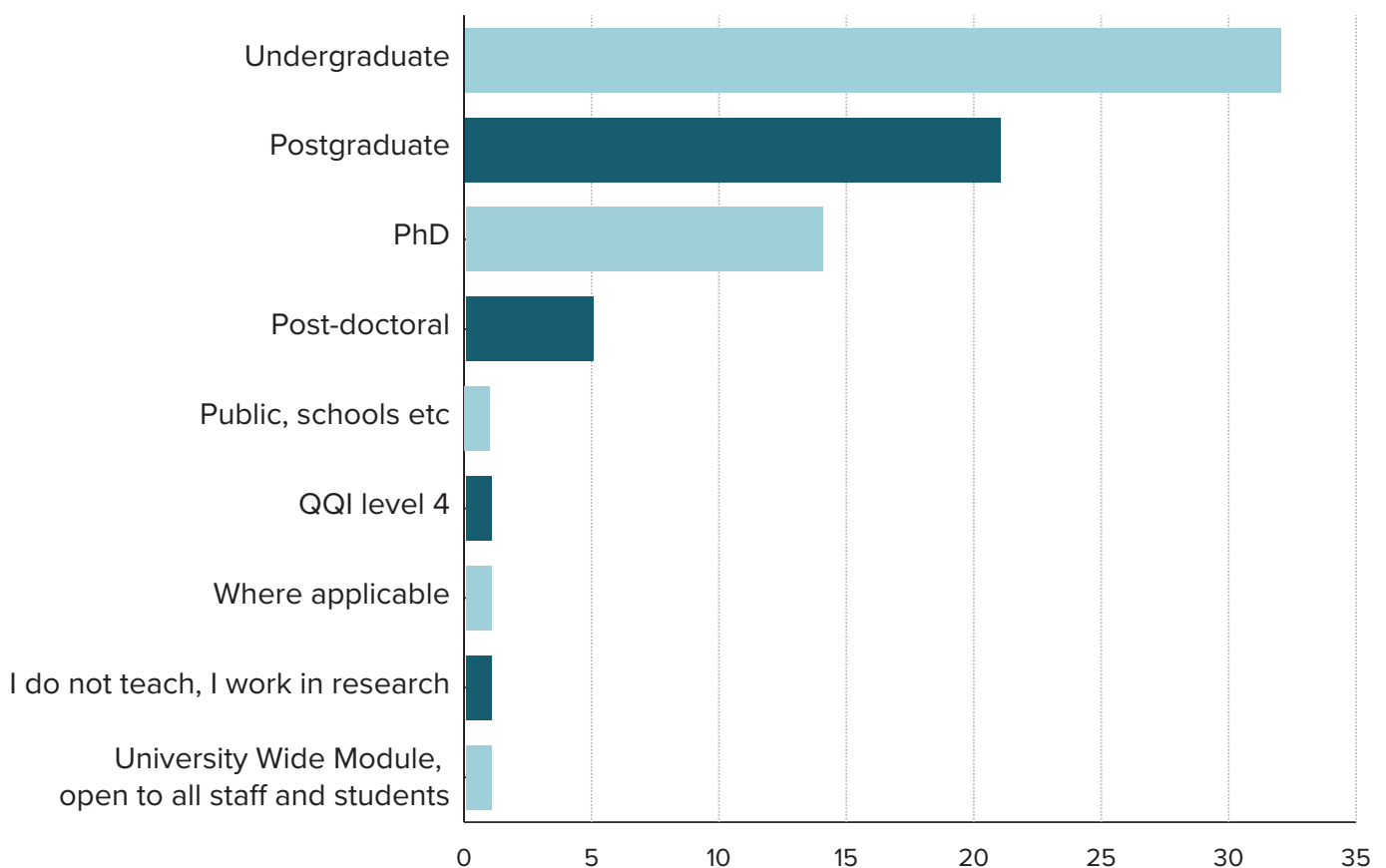
Department/Area	Percentage
Natural Sciences e.g. ecology, earth sciences	29.4%
Geography	17.6%
Engineering & Technology	7.8%
Business	5.9%
Economics	5.9%
Botany	5.9%
Arts & Humanities	3.9%
Education	3.9%
Horticulture	3.9%
Sustainability	2%
Forestry	2%
Agriculture	2%
Outdoor Education	2%
Tourism/Events/Sports/Leisure	2%
Geology	2%
Coastal ecology and sustainability	2%
Plant & Agri-science	2%

Respondents were asked ‘to what degree are you familiar with the concepts of natural capital and ecosystem services?’. The majority of respondents have strong expertise in these topics (50%), while most others are familiar with the concepts, but would not consider themselves as having deep expertise (40%).

Over 75% of respondents currently teach natural capital and ecosystem services approaches in their curriculum, either as part of a module or a full module, see chart below.



The majority teach at undergraduate or postgraduate level, see graph below.





Question: *Can you provide some of the reasons that you include ecosystem services and natural capital concepts in your teaching?* (NOTE: respondents could select multiple responses.)

Response	Percentage
Introduces students to systems thinking and sustainability science concepts	65.9%
Deals with holistic, integrated management of biodiversity and other natural resources	65.9%
Interdisciplinary concept that conveys the social, ecological and economic concepts of ecosystem management	54.5%
Approach provides opportunities to influence decision-making	29.5%
Approach relates to business and financial sustainability	13.6%
Other	
I would like to incorporate more of this into business & financial economics	2.3% (single respondent)
Teach GIS and Remote Sensing	2.3%
It is relevant to the module and/or programme	2.3%
Provides students with an alternative way of looking at rural service provision	2.3%
Natural capital core to tourism and how it is used	2.3%
Unfortunately, Ireland uses a flawed metric system for looking at Ireland and most metrics are financial/economically based, so sometimes we have to distort and conform to some of the metrics so they are recognised as having a value	2.3%

An open-ended question on the benefits and challenges of teaching Natural Capital & Ecosystem Services approaches received 30 responses and included suggestions for resources needed to teach the approach. The results of this are summarised in the table below and incorporate open-ended responses from other questions. As one participant noted, **“A key benefit and challenge is the same: it needs a multidisciplinary approach that requires integration of a broad range of knowledge and skills”**.

Challenge	Quotes illustrating respondent’s experience
Communicating a new concept and terminology	<p>‘The concepts are very new to some students and the potential for misunderstanding is there’</p> <p>‘Some of this is perceived as being too-far out there, and students have been conditioned to have a narrow focus’</p> <p>‘Challenges in teaching involve communication of range of terminology describing similar concepts’</p> <p>‘Theoretical complexity’</p> <p>‘The challenges are that in recent years the concept of having nature and other environments for aesthetic reasons has been lost, though the importance of well-being and the role of natural environments in that is beginning to be recognised. Agricultural, business and land policies have all played a role in reinforcing that culture, and the flawed economic interpretation of homo-economicus, that ignores the diversity of human nature’</p> <p>‘Ireland utilises a flawed metric systems for looking at society and most metrics are financial and economically based’</p>
Relevance / Application	<p>‘Making the concepts more relevant to all engineers, not just environmental engineers’</p> <p>‘Natural capital accounting is not yet mandatory, but I have been introducing the idea in building energy assessment courses I teach, namely the new IFRS regulations for financial accounting on carbon footprint’</p> <p>‘Ecosystem services mentioned in several modules but is not taught explicitly’</p>
Planning field trips	<p>‘Challenges to plan practical events (weather, time of year and now COVID can be against it)’</p> <p>‘Teaching predominantly outside of May - August miss the months of abundance’</p>
Sourcing data	<p>‘Finding data is always a challenge, particularly habitat maps and habitat condition maps’</p>
Not inclusive of all subjects	<p>‘Soil science, soil ecology, soil ecosystem services seems to be ignored in many Natural Capital texts’</p> <p>‘Few in the School consider this a key component of the tourism and associated sectors’</p> <p>‘In our module, ecosystem services are introduced but not deeply taught’</p>
Few practical examples	<p>‘Finding Irish examples of organisations who have embraced natural capital accounting and tangible experience of using new metrics in strategies’</p> <p>‘Case studies would be useful’</p>



BENEFITS

New thinking and perspectives	<ul style="list-style-type: none">'Exposing students to multiple perspectives that run counter to current financial / economic systems challenges students ... and some colleagues''Provides students with an alternative way of looking at rural service provision''Gets students to think about different types of capital, externalities and what's being left out in traditional cost benefit analysis''Benefit is that students are interested and keen on this subject''The curriculum for this horticulture module is very up to date and covers carbon sequestration, the difference between forestry and native woodland, and touches on ecosystems and biodiversity'
Awareness-raising & engagement	<ul style="list-style-type: none">'Raising awareness of current issues and empowering learners to be agents of change''The subject generally engages students''It increases environmental awareness among students''We can inform the next generation of the critical issues of ecosystem services and biodiversity and that by being informed, change/action is possible''Our horticulture students are well placed to be the first point of contact for citizens interested in conserving biodiversity and habitats through their landscape design and garden building and maintenance work''SDG 12 is about responsible consumption – that can be taken as consumption of the natural resource. If the students understand this, they are then in a position to take ownership of the decision to consume and its impact/mitigation measures. This can build awareness, understanding, respect in light of natural capital and what it means'
Interdisciplinary concept that highlights linkages	<ul style="list-style-type: none">'It is an important concept that links all elements of sustainable development''Holistic approach and understanding to ecosystems''It's a good way to show students how to link ecological concepts to policy''Demonstrates a clear connection with the ecosystem''I would like to incorporate more of this into business and financial economics'
Improves understanding	<ul style="list-style-type: none">'Provides an understanding of the value of plant genetic resources and the issues around them from conservation to political''I teach GIS and Remote Sensing. Mostly assessing condition of ecosystems so it is a framework that facilitates a deeper understand of how GIS and RS can be utilised as assessment tools'

RESOURCES

Online resources, videos, graphics, case studies. Undergraduate and postgraduate levels	<ul style="list-style-type: none">'Short videos, good illustrations, selection of online open education resources e.g. case studies would all be useful' Resources for undergraduates''A repository for case studies and data that students can interact with and use for decision making''Need a relatively simple "translation" guide showing interrelationships between concepts and terms''Resources similar to the Sulitest (Sustainability literacy) questionnaire could be helpful'
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Modules in which the approach is being studied:

- Agribiosciences, AgriFood Sustainability, Agri-Resilience Challenges
- Animal Production Systems
- Arboriculture
- Biodiversity and Conservation, Biodiversity and Ecology, Biodiversity and Ecosystem Services, Biodiversity and Horticulture, Biodiversity and Coastal Change
- Beekeeping and Pollination
- Biogeography
- Biology
- Botany
- Business and Biodiversity
- Civil Engineering Cost Benefit Analysis
- Climate Change
- Crop and Grassland Production
- Earth Science
- Ecology, Ecology & Conservation Issues, Applied Ecology and Environmental Management
- Economics and the Global Economy
- Ecosystem Services and Coastal Ecology
- Education for Sustainable Development
- Engineering and Environment
- Environmental Land Use and Management, Environmental Management & Sustainability, Environmental Science and Climate
- Entomology
- Establishing Trees and Shrubs
- Fashion Buying
- Food Production Systems
- Forest Mensuration, Forestry and the Environment, Forest Inventory, Forest Management Plan
- Geographical Information: Data and Tools, Applied Geographical Information Systems
- Heritage Culture and Tourism
- Human-Biodiversity Interactions



- International Political Economy
- Inquiry-based Learning and the Environment
- Land Use and the Environment
- Marine Economics
- One Health
- Organisms to Ecosystems
- Outdoor Recreation Activities
- Planning and Policy
- Plant-Animal Interactions, Plant Biology, Plant Breeding and Biotechnology, Plant Molecular Biology, Plant Ecophysiology, Plant Ecosystems and Resources, Plant Protection, Plants and Society
- Pollution Biology
- Retail and Services Management
- Rural Development, Rural Service Provision, Rural Tourism
- Society and Environment, Social, Environmental and Scientific Education, Intro to Social Science
- Soil Ecology, Soil Resources, Soil Science, Soil, Waste and Energy
- Social and Therapeutic Horticulture
- Sustainability, Sustainable Business, Corporate Sustainability, Sustainable Food Production, Sustainable Land Use, Sustainable Sport and Leisure Facilities Management, Sustainable Tourism
- Terrestrial Field Ecology
- Wildlife Conservation
- Zoology

Next steps

Thanks to all who participated in this research. With further surveys, we hope to see the range of areas where the natural capital and ecosystem services approach is taught grow considerably, due to rising awareness of and application of the approach in academia and wider society.

- This is a **pilot baseline study** with a small sample size (51), which we hope to expand upon and replicate in the future.
- We intend to develop our research into **assisting educators in building curriculums on natural capital and ecosystem services**
- Our organisation can offer **guest speakers to institutions** and will host regular **webinars** on these topics
- We aim to develop more **learning resources and case studies** for educators and students

Some further resources on the subject of natural capital are available on [our website](#) and at the links below:

- [Valuing Ecosystem Cultural Services](#)
- [Teaching Ecosystem Services: a pathway to improve students' argumentation in favour of nature conservation and sustainable development?](#)

Please email Natural Capital Ireland at info@naturalcapitalireland.com with queries and sign up to our mailing list [HERE](#) to keep up to date with global and local natural capital developments and our various projects.

AUTHORS: Survey and survey report compiled by Kate Flood, Department of Geography, Archaeology and Irish Studies, NUIG, with editorial assistance from Fiona Smith, NCI. With thanks to the NCI Steering Committee who provided feedback on the survey design.

Cover image: Irish Peatlands Postgraduate Group at Girley Bog NHA/SAC (Photo Credit: Marine Valmier)