



Countries and Conservation

Introduction

The Organization for Economic Cooperation and Development (OECD) collects data on what percentage of each country's land and marine area it protects - usually "protected" areas are in some kind of national park.

In this project we will explore how different countries compare with each other in terms of the percentage of their total area that they conserve now, and look at historical changes in conservation and consider what may have triggered the changes we can see in the data.

To do this we will need to understand the datasets and find meaningful ways to compare the different sets of figures so that we can make sense of them.

Inquiry questions

- Which countries rate the highest in terms of protected environments?
- Does it relate to the size of the country? The wealth?
- Has the proportion of protected environments changed over time? Why/Why not?
- Are countries protecting enough of their natural land and sea environments?

Year levels

- Years 7-8

Equipment needed

- Computer and a copy of the dataset
- Internet access for further research on countries
- Extension: Python programming software

Curriculum Areas

CURRICULUM AREA	STRAND	SUB-STRAND
Science	Science Understanding	Science as a human endeavour
	Science Inquiry Skills	Questioning and Predicting Recording and Processing Analysing and Evaluating Communicating
Mathematics	Number and Algebra	Real Numbers Linear and Non-Linear Relationships
	Statistics and Probability	Data representation & interpretation
Digital Technologies	Data and Information	
	Creating Digital Solutions	
The Humanities	Eco and Business	Economic and Business Reasoning and Interpretation
English	Reading and Viewing Writing Speaking and Listening	Interpreting, analysing, evaluating Creating texts Interacting with others
Geography	Geographical Concepts and Skills	Place, space and interconnection Data and Information Water in the World Landforms and Landscapes Biomes and food security Environmental change and management
Capabilities	Ethical Capability	Understanding Concepts

Success Criteria

In this unit the student will improve their data literacy and data analysis skills by :

Knowing:

- What data is and how it is collected
- That data can help tell a story about the world around us and help us solve problems

Doing:

- Collecting data
- Applying basic mathematical skills to make sense of data
- Sharing the data story with others in different ways.
- Compare different countries and research the historical reasons why different countries may have changed at different rates.
- Learn the graphing skills that enable these comparisons.

Understanding:

- How to check your data for possible errors
- How countries' commitments to conservation has changed over time, as seen in the percentage of their landmass and marine areas that are protected.

Step 1

- ❑ Start by downloading the file that contains the percentage of protected land by country for 2019: [protectedareas2019Land.csv](#)
- ❑ Open the file in a spreadsheet such as Numbers, Excel, or Google Sheets.
- ❑ The file contains 123 rows and 23 columns. It doesn't all fit on one screen.
 - *How will you make sense of the data?*

Step 2

- ❑ Work your way through the headers and see if you can work out what they all mean.
- ❑ Make a list of the things you notice about the dataset. For example:
 - ❑ Some of the columns are effectively duplicated
 - ❑ Some columns seem to have the same value for the entire dataset (how can you quickly and easily check this? Sort the column)
 - ❑ What values do you understand? Which values don't make sense or are hard to understand?
- ❑ As a class, combine your lists and see what else other people noticed that you didn't.

Step 3

- ❑ Highlight the country column and the value column, and insert a chart.
 - *What is the best chart type to use to display this data? Why? What default did your spreadsheet package choose?*
- ❑ Update the title and axes labels on the chart to ensure that it is clear what the graph is displaying.

Step 4

Discussion:

- *What do you notice about the graph?*
- *What does the "values" column represent?*
- *What is the highest value shown in the chart?*
- *Why is this a problem?*
- *What reasons can you think of for this value?*

Step 5

- ❑ Make a copy of the data and put it into a new sheet. (Tip: If you just copy across the country and values columns, it will make the data easier to work with.)
- ❑ Remove the value for 'St Helena' and make a new chart.
- ❑ Notice that there is another problematic value.
 - *Is it ok to just remove this datapoint? Why/why not?*
 - *If you remove this point, are there any other values in the dataset that you now have doubts about? Why/why not? Given that there were issues with two values, might there be issues with more that are not so obvious?*

- ❑ As a class, brainstorm the ways a percentage over 100 might appear in the data.
 - *Can you think of any ways the value might be correct?*
 - *How might you be able to investigate the source of these values, to try to identify the error?*

Step 6

- ❑ Choose between 10 and 20 countries that particularly interest you.
- ❑ Select the 2019 values for those countries, and create a graph of those values.
 - *What is the most useful graph type for this kind of data? Why?*

Step 7

- ❑ Using the graph, identify the country with the **largest percentage of protected area**.
 - ❑ *How large is the difference? What factors might have led to this country having a greater percentage than others?*
- ❑ Research and record the surface area for the top 5 countries.
- ❑ Calculate the area of protected environment as a percentage of the total surface area for each country.
 - *Does this give you a different perspective on the differences shown in the graph? For example, Canada has only 10.645% protected area, while Belgium has 24.909%.*

Step 8

- ❑ Given that comparing countries by percentage of the total area conserved doesn't give a clear view of the size of the area protected, *what other measures might be meaningful ways to compare each country, apart from the obvious measure i.e. area?*
 - *What other information is useful, in order to evaluate a country's commitment to protecting its land ? e.g. Do 'rich' countries do better than 'poorer' countries? How would you find out ?*

Step 9

- ❑ Now open the dataset for a particular country and graph the changes in protected land over time.
 - *What reasons can you think of for the changes you can see in protected land, and when there are sharp increases?*

Extension activity:

- ❑ Write a python program to go through all of the files and determine if any country's protected land percentage ever goes down.

Step 10

- ❑ Choose a country and find out how much land is logged in that country each year. Compare this with the amount of protected land.
 - *How many years does it take, if these figures remain the same, for that country to log the equivalent of the protected land?*
- ❑ Find a way to represent these figures visually.
 - *Can you use a map of the country to represent this data in an accurate and compelling way?*
- ❑ Create a media product - poster, video, infographic, or web page - that summarises what you found while analysing this dataset.

Tools:

- Piktochart
- Canva

Curriculum Links (VCAA 2016)

The following table identifies the Curriculum links relevant to the delivery of this unit of work. More detailed assessment rubrics have also been provided for each Curriculum Area.

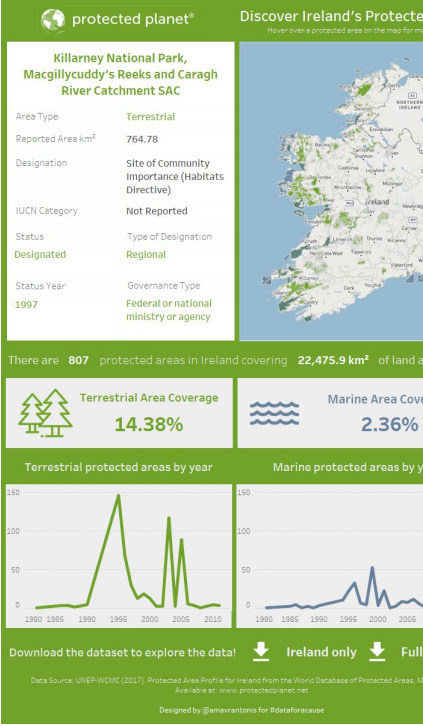
Curriculum Area: Strand: • Sub-strands	Year 7	Year 8
Science: Science Understanding: • Science as a human endeavour	<ul style="list-style-type: none"> Scientific knowledge and understanding of the world changes as new evidence becomes available; science knowledge can develop through collaboration and connecting ideas across disciplines and practice of science. 	
Science: Science Inquiry Skills: • Questioning and predicting	<ul style="list-style-type: none"> Identify questions, problems and claims that can be investigated scientifically and make predictions based on scientific knowledge 	
Science: Science Inquiry Skills: • Recording and processing	<ul style="list-style-type: none"> Construct and use a range of representations including graphs, keys and models to record and summarise data from students' own investigations and secondary sources, and to represent and analyse patterns and relationships 	
Science: Science Inquiry Skills: • Analysing and evaluating	<ul style="list-style-type: none"> Use scientific knowledge and findings from investigations to identify relationships, evaluate claims and draw conclusions Reflect on the method used to investigate a question or solve a problem, including evaluating the quality of the data collected, and identify improvements to the method 	
Science: Science Inquiry Skills: • Communicating	<ul style="list-style-type: none"> Communicate ideas, findings and solutions to problems including identifying impacts and limitations of conclusions and using appropriate scientific language and representations 	
Mathematics: Number and Algebra: • Real Numbers	<ul style="list-style-type: none"> Find percentages of quantities and express one quantity as a percentage of another, with and without digital technologies 	<ul style="list-style-type: none"> Solve problems involving the use of percentages, including percentage increases and decreases and percentage error, with and without digital technologies
Mathematics: Number and Algebra: • Linear & non-linear relationships	<ul style="list-style-type: none"> Investigate, interpret and analyse graphs from real life data, including consideration of domain and range 	<ul style="list-style-type: none"> Plot graphs of non-linear real life data with and without the use of digital technologies, and interpret and analyse these graphs
Mathematics: Statistics and Probability • Data representation and interpretation	<ul style="list-style-type: none"> Identify and investigate issues involving numerical data collected from primary and secondary sources 	<ul style="list-style-type: none"> Investigate the effect of individual data values including outliers, on the range, mean and median
Digital Technologies: Data and Information	<ul style="list-style-type: none"> Acquire data from a range of sources and evaluate their authenticity, accuracy and timeliness 	<ul style="list-style-type: none"> Analyse and visualise data to create information and address complex problems, and model processes, entities and their relationships using

	<ul style="list-style-type: none"> Analyse and visualise data using a range of software to create information, and use structured data to model objects or events 	structured data
Digital Technologies: Creating Digital Solutions	<ul style="list-style-type: none"> Define and decompose real-world problems taking into account functional requirements and sustainability (economic, environmental, social), technical and usability constraints 	<ul style="list-style-type: none"> Define and decompose real-world problems precisely, taking into account functional and non-functional requirements and including interviewing stakeholders to identify needs
Humanities: Eco and Business: <ul style="list-style-type: none"> Economic and Business Reasoning and Interpretation 	<ul style="list-style-type: none"> Identify relationships and trends, and generate a range of alternatives for an economic or business issue or event, evaluating The potential costs and benefits of each 	<ul style="list-style-type: none"> Generate a range of viable options, taking into account multiple perspectives, use simple cost-benefit analysis to recommend and justify a course of action, and predict the intended and unintended Consequences of economic and business decisions
English	<ul style="list-style-type: none"> Use comprehension strategies to interpret, analyse and synthesise ideas and information, critiquing ideas and issues from a variety of textual sources Plan, draft and publish imaginative, informative and persuasive texts, selecting aspects of subject matter and particular language, visual, and audio features to convey information and ideas to a specific audience Identify and discuss main ideas, concepts and points of view in spoken texts to evaluate qualities, using interaction skills when sharing interpretations or presenting ideas and information 	<ul style="list-style-type: none"> Use comprehension strategies to interpret and evaluate texts by reflecting on the validity of content and the credibility of sources, including finding evidence in the text for the author's point of view. Create imaginative, informative and persuasive texts that raise issues, report events and advance opinions, using deliberate language and textual choices, and including digital elements as appropriate. Plan, rehearse and deliver presentations, selecting and sequencing appropriate content, including multimodal elements, to reflect a diversity of viewpoints, using voice and language conventions to suit different situations, modulating voice and incorporating elements for specific effects.
Geography: Geographical Concepts and Skills: <ul style="list-style-type: none"> Place, space and interconnection 	<ul style="list-style-type: none"> Identify, analyse and explain interconnections within places and between places and identify and explain changes resulting from these interconnections 	
Geography: Geographical Concepts and Skills: <ul style="list-style-type: none"> Data and information 	<ul style="list-style-type: none"> Collect and record relevant geographical data and information from useful primary and secondary sources, using ethical protocols 	
Geography: Geographical Concepts and	<ul style="list-style-type: none"> Classification of environmental resources and the forms that water takes as a resource 	

<p>Skills:</p> <ul style="list-style-type: none"> • Water in the World • Landforms and Landscapes 	<ul style="list-style-type: none"> • The spiritual, economic, cultural and aesthetic value of water for people, including Aboriginal and Torres Strait Islander peoples and peoples of the Asia region, that influence the significance of places
<p>Geography: Geographical Concepts and Skills:</p> <ul style="list-style-type: none"> • Biomes and food security 	<ul style="list-style-type: none"> • Distribution and characteristics of biomes as regions with distinctive climates, soils, vegetation and productivity
<p>Geography: Geographical Concepts and Skills:</p> <ul style="list-style-type: none"> • Environmental change and management 	<ul style="list-style-type: none"> • Environmental, economic and technological factors that influence environmental change and human responses to its management • Environmental worldviews of people and their implications for environmental management • Causes and consequences of an environmental change, comparing examples from Australia and at least one other country • Aboriginal and Torres Strait Islander peoples' approaches to custodial responsibility and environmental management in different regions of Australia • Application of environmental economic and social criteria in evaluating management responses to an environmental change, and the predicted outcomes and further consequences of management responses on the environment and places, comparing examples from Australia and at least one other country
<p>Capabilities: Ethical capability:</p> <ul style="list-style-type: none"> • Understanding Concepts 	<ul style="list-style-type: none"> • Investigate criteria for determining the relative importance of matters of ethical concern • Discuss the role of context and experience in ethical decision making and actions

Resources

Helpful websites

<p>The New Data For A Cause Challenge - Visualize the world's protected areas</p>	<p>https://www.olgatsubiks.com/single-post/2017/05/17/The-New-Data-For-A-Cause-Challenge---Visualize-worlds-protected-areas</p>																					
<p>Winners of Data for a Cause Challenge</p>	<p>https://www.olgatsubiks.com/single-post/2017/06/08/And-the-winners-of-the-Protected-Planet-Challenge-are</p>																					
<p>United Nations Environment Programme Environment for development - Environmental Data Explorer</p>	<p>https://geodata.grid.unep.ch/</p>	 <p>protected planet® Discover Ireland's Protected Areas</p> <p>Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC</p> <table border="1"> <tr> <td>Area Type</td> <td>Terrestrial</td> </tr> <tr> <td>Reported Area km²</td> <td>764.78</td> </tr> <tr> <td>Designation</td> <td>Site of Community Importance (Habitats Directive)</td> </tr> <tr> <td>IUCN Category</td> <td>Not Reported</td> </tr> <tr> <td>Status</td> <td>Type of Designation</td> </tr> <tr> <td>Designated</td> <td>Regional</td> </tr> <tr> <td>Status Year</td> <td>Governance Type</td> </tr> <tr> <td>1997</td> <td>Federal or national ministry or agency</td> </tr> </table> <p>There are 807 protected areas in Ireland covering 22,475.9 km² of land and sea.</p> <table border="1"> <tr> <td>Terrestrial Area Coverage</td> <td>Marine Area Coverage</td> </tr> <tr> <td>14.38%</td> <td>2.36%</td> </tr> </table> <p>Terrestrial protected areas by year Marine protected areas by year</p> <p>Download the dataset to explore the data! Ireland only Full dataset</p> <p><small>Data Source: UNEP-WCMC (2017). Protected Area Profile for Ireland from the World Database of Protected Areas, May 2016. Available at: www.protectedplanet.net. Designed by @amexrentons for #dataforacause.</small></p>	Area Type	Terrestrial	Reported Area km ²	764.78	Designation	Site of Community Importance (Habitats Directive)	IUCN Category	Not Reported	Status	Type of Designation	Designated	Regional	Status Year	Governance Type	1997	Federal or national ministry or agency	Terrestrial Area Coverage	Marine Area Coverage	14.38%	2.36%
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