NORTHERN ENVIRONMENTAL EDUCATION DEVELOPMENT

NEED-Ireland Curriculum analysis

This report is a comparative analysis of the Irish National Core Curriculum for primary- and secondary schools, the NEED Project themes, and learning opportunities in the NEED-Ireland target area. The analysis fulfils the work program under Action 12 of Work Package 3 and comprises the following parts:

- Overview of *SESE & Geography Curriculum* (Upper Primary Level) ; *Geography Curriculum* (Junior Second Level); *Geography Curriculum* (Upper Second Level
- General objectives of Irish curricula vs NEED themes
- Core skills in Irish geography and science curricula at primary- and second-level
- Geoscience-related activities, exercises and teacher demonstrations
- Specific topics in Irish curricula vs NEED themes, with suggested activities
- Visitor centre exhibits: Cliffs of Moher

SESE & Geography Curriculum – Primary Level:

The ***Social, environmental and scientific education*** curriculum should enable students to develop the following skills: questioning; observing; predicting; exploring; planning; making; investigating and experimenting; estimating and measuring; analysing; recording and communicating; evaluating

The ***Social, environmental and scientific education*** curriculum includes four strands:

- Living things
- Energy and forces
- Materials
- Environmental awareness and care

The ***Geography*** curriculum should enable students to develop the following skills: a sense of place and space; maps, globes, and graphical skills; geographical investigation skills.

The ***Geography*** curriculum includes three strands:

- Human environments
- Natural environments
- Environmental awareness and care

Social, environmental and scientific education

Social, environmental and scientific education (SESE) provides opportunities for the child to explore, investigate and develop an understanding of the natural, human, social and cultural dimensions of local and wider environments; to learn and practise a wide range of skills; and to acquire open, critical and responsible attitudes. SESE enables the child to live as an informed and caring member of local, national, European and global communities.

The aims of SESE are:

- to enable the child to acquire knowledge, skills and attitudes so as to develop an informed and critical understanding of social, environmental and scientific issues
- to reinforce and stimulate curiosity and imagination about local and wider environments
- to enable the child to play responsible roles as an individual, a family member and a member of local, regional, national, European and global communities
- to foster an understanding of, and concern for, the total interdependence of all humans, all living things and the Earth on which they live
- to foster a sense of responsibility for the long-term care of the environment and a commitment to promote the sustainable use of the Earth's resources through his/her personal lifestyle and participation in collective environmental decision-making
- to cultivate humane and responsible attitudes and an appreciation of the world in accordance with beliefs and values

Science

Science encompasses knowledge and understanding of the biological and physical aspects of the world and the processes through which such knowledge and understanding are developed.

The science curriculum should enable the child to:

- develop an interest in and curiosity about the world through the exploration and study of living and non-living things
- develop a knowledge and understanding of scientific ideas through the study of living things and the environments in which they live, energy and forces, materials and processes of change
- observe, ask questions, discern patterns, hypothesise, plan, experiment, design, make, measure, discuss, analyse and evaluate results and so develop a scientific approach to problem-solving
- develop and apply constructive thinking in scientific investigations
- understand the application of some basic scientific ideas and concepts in everyday situations
- apply and use scientific knowledge, skills and resources in designing and making tasks
- explore and appreciate the influence that scientific and technological developments have on societies, life-styles, economic activities and the environment
- communicate and record observations, evidence and results of experiments and investigations using a variety of oral, written and graphical forms and other media
- explore the environmental repercussions of human actions on physical, natural and human environments
- understand the interdependence of a wide variety of living things and their environments, recognise the importance of conserving habitats and environments, and begin to understand that all life now and in the future depends on the sustainable development of the planet
- become actively involved in the discussion, exploration and resolution of environmental issues
- understand and apply a safety code in scientific and technological investigations and activities

The aims of **science** education are:

- to develop knowledge and understanding of scientific and technological concepts through the exploration of human, natural and physical aspects of the environment
- to develop a scientific approach to problem-solving which emphasises understanding and constructive thinking
- to encourage the child to explore, develop and apply scientific ideas and concepts through designing and making activities
- to foster the child's natural curiosity, so encouraging independent enquiry and creative action
- to help the child to appreciate the contribution of science and technology to the social, economic, cultural and other dimensions of society
- to cultivate an appreciation and respect for the diversity of living and non-living things, their interdependence and interactions
- to encourage the child to behave responsibly to protect, improve and cherish the environment and to become involved in the identification, discussion, resolution and avoidance of environmental problems and so promote sustainable development
- to enable the child to communicate ideas, present work and report findings using a variety of media

Geography

Geography is the study of the Earth, its inhabitants and the interrelationships between them in the context of place, space and environment. It is concerned with the nature, distribution and interaction of human and natural features over the Earth's surface, the processes which create, sustain or change these features, and the contribution they make to the distinctive character of places.

The content of the geography curriculum is presented in three strands:

- *Human environments*
- *Natural environments*
- *Environmental awareness and care.*

The aims of **geography** are

- to develop knowledge and understanding of local, regional and wider environments and their interrelationships
- to encourage an understanding and appreciation of the variety of natural and human conditions on the Earth
- to develop empathy with people from diverse environments and an understanding of human interdependence
- to develop the ability to use a range of communicative methods, especially those concerned with the development of graphicacy (mapping and other non-verbal, non-numerical forms of data presentation)
- to encourage the development of a sense of place and spatial awareness
- to encourage the development of caring attitudes and responsible behaviour towards the environment, and involvement in the identification, discussion, resolution and avoidance of environmental problems
- to develop an understanding of appropriate geographical concepts.

The **geography** curriculum should enable the child to:

- to develop knowledge and understanding of natural and human environments in the locality, region, Ireland, Europe and the world
- understand some of the natural, social or economic processes which create, sustain or change environments
- study the impact of environmental conditions on the lives of people in the locality and in other areas, and come to appreciate some of the ways in which humans use, modify or influence their environments
- engage in active exploration of local and other environments as an intrinsic element of learning
- acquire the ability to use and understand appropriate investigative methods in the study of natural and human features and phenomena in local and other environments
- develop a sense of place: an understanding and appreciation of the major characteristics of different places
- develop a sense of space: an understanding of how natural and human features are located and distributed in local and other environments and how and why they relate to each other
- develop an appropriate cognitive map of the local area and extend the process to wider geographical settings
- acquire an ability to understand, develop and use a growing range of plans, maps and globes
- develop an ability to acquire, analyse and communicate geographical knowledge using a wide variety of sources, including oral, written and graphical forms, models and globes, information technology and other media
- extend, refine and apply artistic, linguistic and mathematical skills
- learn that the sharing, responsible use and conservation of the Earth's natural and human resources are necessary for the continued existence of life
- develop aesthetic sensitivity to the natural and human elements of the environment and to the repercussions of human actions
- learn of and come to value the diversity of peoples, cultures and societies in Ireland and throughout the world, acquire an awareness of human interdependence and develop empathy with others
- use and value creative, innovative thinking in the exploration and/or resolution of human and environmental issues

Social, Environmental and Scientific Education: GEOGRAPHY 5th & 6th class

Topics related to geology, landscape and the environment that could be the basis of educational modules

Strand: Natural Environments

Unit: The local natural environment

Topic: main natural features in the locality

- locations of natural features
- relationship to other natural features in Ireland
- effect of physical processes on natural features

Topic: influence of natural features on plants, animals and people

Topic: how people, animals and plants have altered and exploited natural features

Unit: Rocks and Soil

Topic: Rocks

- identification of rocks
- use of stone in buildings and other human activities, especially in the locality
- structure of the Earth
- characteristics of rock types and where they occur in Ireland

Topic: Soils

- composition and origins of soils
- relationship between soils and plants / farming

Unit: Planet Earth in Space

Topic: the Earth and the Sun

- sunlight as a source of energy

Topic: Earth, moon and solar system

- interrelationships between these features

Unit: Land, rivers and seas of Ireland

Unit: Weather, climate and atmosphere

Strand: Environmental Awareness

Unit: Environmental Awareness

Topic: interrelationship between climate, natural features, and life in different environments

Topic: recognise aspects of human activities that affect the environment

- quality of air, water
- changes in land use

Unit: Caring for the Environment

Topic: local, national and global environmental issues

- pollution

- traffic
- global warming
- climate change
- ozone depletion
- energy conservation

Strand: Human Environments

Unit: People living and working in the local area and a contrasting part of Ireland

Topic: Settlement, homes and other buildings

- common building materials and their relationship to the environment
- effect of weathering and pollution on the appearance of buildings

Topic: People at work

- location factors for forests and the effect on the landscape and the environment
- location factors for an industry or factory and the effect on the landscape and environment

Social, Environmental and Scientific Education: SCIENCE 5th & 6th CLASS

Strand: Materials

Unit: Properties and characteristics of materials

Topic: origins of common manufactured materials

Topic: identify how the use of materials relates to their properties

Unit: Science and the Environment

Topic: Uses of natural resources and benefits to humanity

Unit: Energy and Forces

Geography Syllabus – Junior Second Level

Aims

1. To promote an awareness of the spatial and temporal patterns which exist in the distribution of environmental phenomena, both natural and cultural
2. To develop an understanding of the processes – natural, social and economic – which operate to produce and shape these patterns
3. To develop an understanding of the complex interactions which occur among these phenomena in a world which is constantly changing
4. To promote a sensitive awareness of environment
5. To encourage in students a sensitive awareness of peoples, places and landscapes, both in their own country and elsewhere.
6. To contribute to students' understanding of important issues and problems in contemporary society.
7. To provide opportunities to foster and build upon students' natural curiosity about their own and other people's social and physical environments
8. To help to develop organised thinking and cognitive abilities – not only in the area of important factual knowledge, but in application, analysis, synthesis, evaluation, creativity and imagination
9. To develop a range of practical, social, valuing and communication skills which are of geographic and of general significance

The **Junior Second Level Geography** syllabus is presented in three sections, each based on a broad theme:

1. The Human Habitat – Processes and Change
    - The Earth's Surface: Shaping the Crust
    - The Restless Atmosphere: The Heat Engine
    - The Workings of our Life Support System

2. Population, Settlement Patterns and Urbanisation
    - Population - Distribution Diversity and Change
    - People on the Move
    - Settlement: Changing Patterns in Where We Live – Villages and Towns
    - Urbanisation: Changing Patterns in Where we Live – Cities

3. Patterns in Economic Activity
    - Primary Economic Activities: The Earth as a Resource
    - Secondary Economic Activities: Building Resources into Products
    - Tertiary Economic Activities: Facilitating Our Use of Resources
    - Economic Inequality: The Earth's Resources – Who Benefits?

Geography Syllabus – Upper Second Level

Aims

1. To develop a knowledge and understanding of a selection of contrasting physical and human (social, economic, and cultural) environments and of the relationships that exist between them
2. To promote an awareness of the spatial, structural, and temporal patterns of environmental phenomena, both physical and human, at a variety of scales, and to realise that these patterns can change with time.
3. To understand the opportunities for, and challenges of, global interdependence
4. To promote the conservation and sustained management of the earth's resources for the welfare and happiness of its inhabitants and for future generations.
5. To recognise, and be sensitive to other people and their culture, here in Ireland and elsewhere.
6. To develop a variety of geographical skills which can be applied to the world of work and to many other aspects of life.
7. To develop and promote active citizenship and to encourage informed participation, through lifelong learning, in society at local, national, European and global level.
8. To encourage the use of information and communication technologies in the teaching and learning of geography.
9. To assist students to become well-informed and responsible citizens and to enable them to progress to further studies or to enter the world of work.

10. To provide students, through their study of geography, with an interesting and enjoyable experience and imbue in them a lifelong love of their natural and cultural environment.

Ordinary Level students are required to study:

- **Core Unit 1** Patterns and processes in the physical environment
- **Core Unit 2** Regional geography
- **Core Unit 3** Geographical Investigation and Skills
- **Elective Unit 4** Patterns and processes in economic activities
- **Elective Unit 5** Patterns and processes in the human environment

Higher Level students are required to study:

- **Core Unit 1** Patterns and processes in the physical environment
- **Core Unit 2** Regional geography
- **Core Unit 3** Geographical Investigation and Skills
- **Elective Unit 4** Patterns and processes in economic activities
- **Elective Unit 5** Patterns and processes in the human environment

- **Optional Unit 6** Global interdependence
- **Optional Unit 7** Geo-ecology
- **Optional Unit 8** Culture and identity
- **Optional Unit 9** The atmosphere—ocean environment

SESE: Social, Environmental and Scientific Education B: Biology C: Chemistry CSPE: Civic, Social and Personal Education

ESS: Environmental and Social Studies G: Geography S: Science

Themes 1	2	3	4	5	Learning objective	Subject	Syllabus Unit
					Primary school (5th and 6th classes)		
√	√	√			Understand how natural processes create and modify environments	SESE (G)	n/a
	√				Understand how natural features influence patterns of vegetation and human settlement and vice versa	SESE (G)	n/a
			√	√	Learn that the sharing, conservation and sustainable use of the Earth's natural resources is necessary for the continued existence of life	SESE (G)	n/a
	√		√	√	Learn about the repercussions of human activities on the environment	SESE (G)	n/a
	√	√	√	√	Explore the influence of technological advances on the environment	SESE (S)	n/a
	√			√	Recognise the interdependence of living things and the importance of conserving environments and of sustainable development	SESE (S)	n/a
√					Understand the structure of the Earth	SESE (G)	n/a
			√		Understand the Earth's natural resources and the uses of Earth materials	SESE (G)	n/a
√					Understand the composition and distribution in Ireland of different rock types	SESE (G)	n/a
√					Show an understanding of the Earth in space and of the interrelationship of the Earth, moon and solar system	SESE (G)	n/a
	√		√	√	Understand the impact of human activities upon the environment	SESE (S)	n/a
		√	√	√	Show an awareness of local, national or global environmental issues	SESE (S)	n/a
					Junior Cycle		
			√	√	Show an understanding of issues related to the world's natural resources and to conservation	ESS	1
			√	√	Show an understanding of the concept of stewardship of planet Earth, including management of finite resources	CSPE	all
√	√				Understand physical environmental phenomena and processes	G	A
√	√				Understand the nature and diversity of physical landscapes	G	A
	√	√	√	√	Understand how physical, cultural, and economic phenomena interact	G	A
			√	√	Understand issues relating to the exploitation and conservation of resources	G	A

	√	√			Understand patterns of settlement and how they are influenced by physical factors	G	B
			√		Understand the Earth's value as a resource	G	B
	√	√	√	√	Discuss how human activity impacts upon the environment, both positively and negatively	S	1C
					Senior Cycle		
√					Show a detailed understanding of the theory of plate tectonics	G	CU1
√					Illustrate how crustal processes are created, modified and destroyed by the tectonic cycle	G	CU1
√	√				Explain and illustrate the continual process of rock formation, change and destruction	G	CU1
√	√				Explain and illustrate how landforms develop from the interaction of the tectonic cycle, rock cycle, and surface forces	G	CU1
√	√				Illustrate how landforms represent a balance, through time, between endogenic and exogenic forces	G	CU1
	√	√		√	Assess at different scales the impact of human activity on the physical processes at work on the landscape	G	CU1
	√				Show a detailed understanding of how physical, economic, and human processes interact in a regional setting	G	CU2
	√	√	√	√	Assess the environmental impact of economic activities at different scales	G	EU4
	√		√	√	Identify and analyse the problems associated with the growth of urban centres	G	EU5
				√	Examine the idea of sustainable development as a model for the future	G	OU6
				√	Discuss human development as a focus for change	G	OU6
	√			√	Explain the development of , and human impacts upon, soils	G	OU7
				√	Examine the relationship between climate and economic development	G	OU8
				√	Examine the factors that influence global climatic patterns	G	OU8
	√		√	√	Explain the effects and measures to control pollution	B	1.4.9
	√		√	√	Discuss the problems associated with, and importance of, waste management	B	1.4.9
			√		Understanding how the uses of everyday [i.e. geological] materials relates to their chemical properties	C	1, 2, 4
			√		Explain the natural sources and uses of hydrocarbons	C	5.1, 5.5
		√			Hazards of methane production; the greenhouse effect	C	5.1
		√			Understanding water pollution, especially by fertilisers and heavy metal ions	C	9
	√				Understanding the carbon cycle	C	OU 1B
				√	Explain how the greenhouse effect is influenced by human activity and natural minimising processes	C	OU 1B
				√	Explain how atmospheric pollution occurs; acid rain; destruction of the ozone layer	C	OU 1B
			√		Explain the environmental impacts of iron and steel production	C	OU 2B

(B) Core skills in Irish geography and science curricula at primary- and second-level:

1. Map drawing / interpretation (M)

2. Aerial photograph interpretation (A)

3. Figure drawing / interpretation (F)

4. Statistical analysis (S)

5. Information technology applications (IT)

6. Interpreting text that contains terminology (T)

7. Investigative and evaluation skills: accurate observation, measurement, recording of data (I)

8. Manipulation of equipment (E)

9. Application of scientific knowledge to everyday experiences and knowledge (K)

(C) Suggested geoscience-related activities, exercises and teacher demonstrations

Activity #	Type	Title	Description	Skills developed								
				M	A	F	S	IT	T	I	E	K
1	exercise	Landforms: aerial photographs	Questions on aerial photographs	√	√		√					
2	exercise	Aerosols	Gathering data from internet	√	√	√						√
3	experiment	Climate change: albedo	Measuring impact of colour on heat absorbance				√			√	√	√
4	experiment	Carbon cycle: atmosphere & ocean	Measuring CO2 asbsorption by fresh- and seawater			√				√	√	√
5	experiment	Carbon cycle: dinosaur breath	Reaction between chalk and vinegar			√				√	√	√
6	experiment	Compaction and cementation	Compacting sand and cement in syringe							√	√	√
7	exercise	Virtual earthquake	www.sciencecourseware.com/eecindex.php	√		√	√	√		√		√
8	exercise	Sea ice and sea level rise	Plotting changes in sea level	√		√	√	√				
9	experiment	Chemical weathering of limestone								√	√	√
10	Exp / demo	Chemistry of limestone								√	√	√
11	exercise	Fossil food webs				√			√			
12	demo	Contact metamorphism								√	√	√
13	exercise	Continental drift: reconstructions		√		√						
14	demo	Destructive plate boundaries										√
15	exercise	Cretaceous crime scene				√			√	√		√
16	exercise	Uses of calcium compounds				√			√			√
17	experiment	crystallisation								√	√	√
18	demo	Dam burst								√		√
19	exercise	Composition of Earth's crust				√						
20	exercise	Deformation			√		√				√	
21	experiment	Rock density		√		√	√			√	√	
22	experiment	Deposition	Sand gutter							√	√	√
23	demo	Earth density	Orange in water				√			√		
24	demo	Earthquakes: building collapse										√

25	experiment	Earthquake prediction	Modelling buildup of stress; bricks, bungee cord				√			√	√	√
26	exercise	Earthquake finder	Using P- and S-waves to find epicentre	√		√	√		√			√
27	exercise	Ecological footprint	Questionnaire; sustainability of lifestyles									√
28	experiment	Erosion	Shaking rock specimens in bottles; digital scales				√			√	√	√
29	experiment	Heat & chemical breakdown of lst	Heating of limestone and examining its properties							√	√	√
30	Exercise	Evolution of the atmosphere	Moving coloured balls in trays				√			√		√
31	exercise	Evolution of the horse	Cards with pictures		√	√			√			
32	exercise	Faulting	Layered sand and flour in plastic box							√		
33	experiment	Fluvial processes	Sand and flowing water in a gutter							√		√
34	exercise	Deformation - folding	Layered sand and flour in plastic box				√			√	√	√
35	exercise	Landforms on Venus	Questions on aerial photographs	√	√	√						
36	exercise	Geological cookie map	Map a cookie / pizza	√								√
37	exercise	Geological timescale	Timescale on a playing pitch			√						
38	exercise	Geological timescale	Timescale on a washing line			√						
39	experiment	Geothermal energy	Heat gravel in a can, measure temp of flowing water			√	√			√	√	√
40	experiment	Deposition: graded bedding	Ladle sediment into a jar of water and shake							√		√
41	experiment	Groundwater								√	√	√
42	experiment	How greenhouse gases absorb heat				√	√			√	√	√
43	exercise	Land use change	Aral sea	√	√	√	√					√
44	exercise	Land use		√					√			√
45	exercise	Landforms on Mars			√				√			√
46	exercise	Landforms on the Moon		√	√	√						
47	experiment	Lava viscosity		√	√		√			√		√
48	experiment	Volcano lava viscosity	Molasses				√			√	√	√
49	exercise	Limestone enquiry							√			√
50	exercise	Little ice age				√						
51	experiment	Seafloor spreading: magnetic stripes				√				√		
52	demo	Mantle convection	Golden syrup									
53	experiment	Mantle properties								√		√
54	experiment	Melting ice & sea level change					√			√	√	√
55	demo	Oil reservoirs								√	√	√

56	experiment	Iron in me								√		√
57	exercise	Permeability		√			√			√		√
58a	experiment	Physical weathering heating & cooling								√	√	√
58b	experiment	Freeze-thaw action								√	√	√
58c	experiment	Chemical weathering								√	√	√
59	exercise	Plate riding		√								√
60	experiment	Porosity; oil reservoirs					√			√	√	√
61	exercise	Fossilisation: preserving the evidence								√		√
62	exercise	Landforms: radar			√			√				
63	exercise	Retreating glaciers		√	√							
64	Exp / demo	Ripples				√				√		√
65	exercise	Sensing volcanic events		√	√	√	√					
66	exercise	Settlement patterns		√		√						
67	experiment	Slope stability		√						√		√
68	Exp / demo	Soil formation							√	√		√
69	experiment	Solar eclipse		√		√						
70	exercise	Sustainable communities							√			√
71	exercise	Temperature and climate		√		√	√	√				√
72	experiment	Sea level rise: thermal expansion								√	√	√
73	Exp / demo	Tsunami		√		√	√	√		√		√
74	experiment	Using solar energy					√			√	√	√
75	experiment	Volcano	Coca-cola							√		√
76	demo	Intrusive & extrusive igneous rocks								√	√	√
77	exercise	Volcanic hazards		√	√	√						
78	experiment	Volcano tiltmeter					√			√	√	√
79	experiment	Weathering								√	√	√
80	Exp / demo	Wind erosion		√	√					√		√
81	exercise	How much am I worth?					√					√
82	experiment	Weight of a dinosaur										
83	experiment	Rocks as insulators								√	√	√
84	exercise	Depth of oceans										
85	exercise	Extinction of dinosaurs							√	√		

86	exercise	Ocean spreading		√			√						
87	exercise	Rock ID								√			
88	exercise	Geology / chemistry through the window											√

(D) Specific topics in Irish curricula vs NEED themes, with suggested activities

Themes 1	2	3	4	5	Topic	Subject	Activity / Activities
					Primary school (5th and 6th classes)		
	√				Relationship between natural and other features	SESE	
	√	√			Effects of physical processes on natural features	SESE	9, 20, 22, 28, 32-34, 40, 58, 64, 79, 80
	√	√			Influence of natural features on plants, animals and people	SESE	66
√					Identification of rocks	SESE	87, 36-38
			√		Uses of rocks	SESE	16, 56, 74, 81, 88
√					Structure of the Earth	SESE	13, 14, 19, 23, 52, 53, 59, 86
√					Characteristics of different rock types and where they occur in Ireland	SESE	88
	√				Composition and origin of soils	SESE	28, 68
	√				Relationship between soils and vegetation patterns / farming	SESE	
			√		Sunlight as a source of energy	SESE	74
√					Relationships between the Earth, moon and sun	SESE	69
	√		√	√	Influence of human activities on air and water quality and land use patterns	SESE	
				√	Global warming	SESE	8, 42, 54, 63, 71, 72
				√	Climate change	SESE	2-4, 8, 42, 50, 54, 63, 71, 72
				√	Ozone depletion	SESE	
			√	√	Energy conservation	SESE	27, 70
					Common building materials	SESE	16
	√				Effects of weathering and pollution on the appearance of buildings	SESE	
	√				Location factors for forests, industry and tourism and the effects on the landscape	SESE	43, 44, 49
			√		Relationship between the uses of materials and their properties	SESE	10, 16
			√		Natural resources	SESE	16, 39, 55, 60, 74
					Junior Certificate		
√					Rocks: classification, characteristics, formation (the rock cycle)	G	6, 12, 17, 20-22, 32, 34, 36-38, 57, 60, 64, 75, 76, 83, 87
√					Distribution of rocks in Ireland	G	

√					Structure of the Earth	G	19, 23
√					Plate tectonics	G	7, 13, 14, 59, 86
	√				Mechanical and chemical weathering	G	9, 10, 58, 79
	√				Mass movement	G	67
	√				Agents of erosion	G	28, 33, 40, 64, 80
		√			Natural hazards	G	7, 18, 24, 25, 26, 47, 48, 65, 67, 73, 75, 77, 78
			√		Uses of geological materials, including fossil fuels	G	16, 56, 74, 81, 88
			√	√	Human interactions with the atmosphere, including burning of fossil fuels	G	2, 5, 30, 42
	√				Soil: composition and formation	G	28, 68
	√				Relationship between soil and vegetation	G	
	√				Relationship between human settlement patterns and physical factors	G	44, 66
			√		Water as a renewable resource	G	41
			√		Natural sources of energy	G	39, 55, 60, 74, 83
					Leaving Certificate		
√					Structure of the Earth	G	19, 23
√					Plate tectonics; plate boundaries	G	7, 13, 14, 59, 86
√		√			Geographic distribution of volcanoes and earthquakes and their effects	G	7, 14, 24, 25, 26, 32, 47, 48, 65, 75, 77, 78
√					Formation of different rock types; the rock cycle	G	6, 12, 17, 20-22, 32, 34, 36-38, 57, 60, 64, 75, 76, 83, 87
	√				Weathering processes	G	9, 10, 58, 79
√					Human interactions with the rock cycle	G	
	√	√			Effects on landforms of volcanoes, sedimentary structures, and deformational structures	G	
	√				Landforms associated with different rock types	G	1, 35, 45, 46
	√	√			Mass movement	G	67
	√				Fluvial processes and landforms	G	22, 28, 33, 64
	√				Glacial processes and landforms	G	
	√				Coastal processes and landforms	G	
	√				Isostasy; fluvial adjustment to base level	G	
	√				Effects of overgrazing, overcropping and deforestation on mass movement	G	

	√	√			Effects of HEP, canals and flood prevention measures on river processes	G	
	√				Effects of recreational pressures, coastal defence work, and conservation on coastal processes	G	
	√				Geomorphological regions: the Burren, Munster Ridge & Valley, North European Plain	G	
			√		Economic use of renewable and non-renewable resources	G	39, 55, 60, 74, 83
			√	√	Impact of burning fossil fuels and use of alternative energy sources	G	2, 8, 39, 42, 54, 63, 71, 72
	√		√	√	Environmental pollution at local, national and global levels	G	
	√		√	√	Sustainable economic development and controlled environmental impact	G	27, 70
	√		√	√	Conflicts between economic- and environmental interests	G	43, 44, 49
	√			√	Global deforestation, desertification, and global warming	G	8, 42, 54, 63, 71, 72
	√				Composition and characteristics of soils	G	28, 68
	√				Global distribution of soil types	G	
	√				Soil processes	G	
	√				Impacts of human activities on soils	G	
	√				Relationship between soils, climate and vegetation	G	
			√		Occurrence and uses of radioactivity	C	39
			√		Uses of geological materials and how this relates to their chemical properties	C	
			√		Natural sources and uses of hydrocarbons	C	55, 60
		√		√	Hazards of methane production; the greenhouse effect	C	
			√		Water pollution	C	
√					The carbon cycle	C	4, 5
			√	√	Atmospheric pollution; acid rain; destruction of the ozone layer	C	

(E) Visitor centre exhibits: Cliffs of Moher

Name of display	Type of display	Inter-action	Curriculum topics	Type of skill								
				M	A	F	S	IT	T	I	E	K
Ramparts of Rock	Wall panel	Minor (press one button)	Distribution of different rock types in Ireland	√					√			√
The Stones of Clare	Wall panel	No	Characteristics and formation of different rock types; Effects of physical processes on natural features	√					√			√
Untitled touchscreen	Interactive touchscreen	Extensive (includes quiz)	Characteristics and formation of different rock types; Effects of physical processes on natural features			√			√			√
Rock samples	Unlabelled rocks	No										
Changing Earth	AV display	Minor (press buttons)	Plate tectonics (indirectly)	√								
Changing Climate	AV display	Minor (press buttons)	Climate change; weather patterns and processes	√								√
Wind at the Cliffs of Moher	Wall panel	No	Weather patterns and processes			√						√
Plate tectonics	Wall panel	No	Plate tectonics; structure of the Earth; radioactivity; plate boundaries			√			√			
Rain and Rock	Wall panel	No	Karst landscapes; isostasy			√						√
Mysterious Lost Rivers	Wall panel	Minor (press buttons)	Karst landscapes	√		√						
An Impossible Cave	Wall panel	No	Karst landscapes			√						
The Green Holes	Wall panel	No	Karst landscapes			√						

(F) Development of modules:

Types of learning activity in visitor centres:

1. Ranger-led workshops
2. Interactive exhibits
3. Manipulation of objects
4. Worksheets
5. 3D visualisation
6. References to current events
7. Opinion board

NEED target groups:

Primary schools

Secondary schools

Third-level institutions

Teachers

Adults

Landowners

Businesses