IB ESS YEAR 2 - Unit 6 Biodiversity

Teacher(s)	IB ESS PLC	**Subject Group and Course**	Group 4 - ESS		
Course Part and Topic	Topic 3 Biodiversity Subtopics 3.1 and 3.2 - Intro and Origins of Biodiversity 3.3 and 3.4: Threats and Conservation of Biodiversity	**SL or HL / Year 1 or 2**	SL Year 2	**Dates**	April (6 weeks)
Unit Description and Texts		**DP Assessment(s) for Unit**			
• Intro and Origins of Biodiversity • Biodiversity Threats and Conservation • Oxford Textbook Topic 3		• Formative/Summative assessment quizzes and activities/reports to check for understanding - Based in IB exam questions and format			

INQUIRY: establishing the purpose of the unit

Transfer Goals

List here one to three big, overarching, long-term goals for this unit. Transfer goals are the major goals that ask students to "transfer" or apply their knowledge, skills, and concepts at the end of the unit under new/different circumstances, and on their own without scaffolding from the teacher.

Statement of Inquiry
Global biodiversity is decreasing rapidly due to human activity.
Phenomenon: The term "biodiversity' refers to the fact that heterogeneity at different ecological levels is a fundamental property of natural systems.

Significant Ideas (3.1-3.2)

- Biodiversity can be identified in a variety of forms, including species diversity, habitat diversity and genetic diversity.
- The ability to both understand and quantify biodiversity is important to conservation efforts.
- Interpreting diversity is complex; low diversity can be present in natural, ancient and unpolluted sites (for example, in Arctic ecosystems).
- Species diversity within a community is a component of the broader description of the biodiversity of an entire ecosystem.
- Evolution is a gradual change in the genetic characteristics of populations over many generations, achieved largely through the mechanism of natural selection.

- Environmental change gives new challenges to species, which drives the evolution of diversity.
- There have been major mass extinction events in the geological past.
- Natural selection is an evolutionary driving force, sometimes called “survival of the fittest”. In this context, the meaning of “fittest” is understood to be “best-suited to the niche”.

Significant Ideas (3.3-3.4) for Student Understanding

1. While global biodiversity is difficult to quantify, it is decreasing rapidly due to human activity. Classification of species conservation status can provide a useful tool in the conservation of biodiversity.
2. The impact of losing biodiversity drives conservation efforts.
3. The variety of arguments given for the conservation of biodiversity will depend on EVSs.
4. There are various approaches to the conservation of biodiversity, each with associated strengths and limitations.

Guidance:

- The total number of classified species is a small fraction of the estimated total of species, and it continues to rise. Estimates of extinction rates as a consequence are also varied, but current extinction rates are thought to be between 100 and 10,000 times greater than background rates.
- Case studies of three species should be carried out. In each case, the ecological, sociopolitical or economic pressures that are impacting on the species should be explored. The species’ ecological roles and the possible consequences of their disappearance should be considered.
- Economic arguments for preservation often involve valuation of ecotourism, of the genetic resource, and commercial considerations of the natural capital. Ecological reasons may be related to the ecosystem. Ethical arguments are very broad, and can include the intrinsic value of the species or the utilitarian value.
- International conventions on conservation and biodiversity have been adopted over the past decades.
- A specific example of a protected area and the success it has achieved should be studied

ACTION: teaching and learning through inquiry

Content / Skills / Concepts - Essential Understandings	**Learning Process** *Check the boxes for any pedagogical approaches used during the unit. Aim for a variety of approaches to help facilitate learning.*
<u>Students will know the following content:</u> ❖ Estimates of the total number of species on Earth vary considerably. They are based on mathematical models, which are influenced by classification issues and a lack of	supporting learning:

finance for scientific research, resulting in many habitats and groups being significantly under-recorded.

- The current rates of species loss are far greater now than in the recent past, due to increased human influence. The human activities that cause species extinctions include habitat destruction, introduction of invasive species, pollution, overharvesting and hunting.
- The International Union of Conservation of Nature (IUCN) publishes data in the "Red List of Threatened Species" in several categories. Factors used to determine the conservation status of a species include: population size, degree of specialization, distribution, reproductive potential and behavior, geographic range and degree of fragmentation, quality of habitat, trophic level, and the probability of extinction.
- Tropical biomes contain some of the most globally biodiverse areas and their unsustainable exploitation results in massive losses in biodiversity and their ability to perform globally important ecological services.
- Most tropical biomes occur in less economically developed countries (LEDCs) and therefore there is conflict between exploitation, sustainable development and conservation.
- Arguments about species and habitat preservation can be based on aesthetic, •ecological, economic, ethical and social justifications.
- International, governmental and non-governmental organizations (NGOs)
- are involved in conserving and restoring ecosystems and biodiversity, with varying levels of effectiveness due to their use of media, speed of response, diplomatic constraints, financial resources and political influence**.**
- Recent international conventions on biodiversity work to create collaboration between nations for biodiversity conservation.
- Conservation approaches include habitat conservation, species-based conservation and a mixed approach.
- Criteria for consideration when designing protected areas include size, shape, edge effects, corridors, and proximity to potential human influence.
- Alternative approaches to the development of protected areas are species- based conservation strategies including:
  – CITES
  – captive breeding and reintroduction programmes, and zoos
  – selection of "charismatic" species to help protect others in an area (flagship species)
  – selection of keystone species to protect the integrity of the food web.
- Community support, adequate funding and proper research influence the success

☒ Lecture

□ Socratic seminar

☒ Small group/pair work

☒ PowerPoint lecture/notes

☒ Individual presentations

☒ Group presentations

☒ Student lecture/leading

☒Interdisciplinary learning

Details:

Students will learn through a combination of presentations, team/small group work, activities surrounding threats to and conservation of biodiversity, and a two-day outdoor activity completing a plant biodiversity index (ACFOR scale)

Other(s): Use of social media - Instagram/Twitter for increased awareness - creation of a children's book, game, etc to inform the younger generation of issues surrounding biodiversity

Formative assessment(s):
Quizzes
In class activities
Case studies
Research assignments

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of conservation efforts.
❖ The location of a conservation area in a country is a significant factor in the success of the conservation effort. Surrounding land use for the conservation area and distance from urban centres are important factors for consideration in conservation area design

<u>Students will develop the following skills:</u>

● Discuss the case histories of three different species: one that has become extinct due to human activity, another that is critically endangered, and a third species whose conservation status has been improved by intervention.
● Describe the threats to biodiversity from human activity in a given natural area of biological significance or conservation area.
● Evaluate the impact of human activity on the biodiversity of tropical biomes.
● Discuss the conflict between exploitation, sustainable development and conservation in tropical biomes.
● Explain the criteria used to design and manage protected areas.
● Evaluate the success of a given protected area.
● Evaluate the biodiversity of a protected area using the ACFOR biodiversity index method.
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International Mindedness:

Conservation needs to work at the local grassroots level to create meaningful change in the communities that live alongside conservation areas. International organizations are important for enforcing the Convention on International Trade in Endangered Species (CITES) agreement, assessing global status of species' numbers and influencing governments.

The science of taxonomy is important to understand species extinction. Major surveys are carried out using international teams of specialists.

International organizations such as the World Wildlife Fund (WWF), Greenpeace, Friends of the Earth International (FoEI) and Earth First! undertake global programmes in terms of conservation of biodiversity
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Summative assessments:
ACFOR outdoor
Summative assessment over each subtopic and over Topic 3 all
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Differentiation:

☒ Affirm identity - build self-esteem

☒ Value prior knowledge

☒ Scaffold learning

☒ Extend learning

Details:

● SWD/504 – Accommodations Provided
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	• *ELL – Reading & Vocabulary Support* • *Intervention Support* • *Extensions – Enrichment Tasks and Project*

Approaches to Learning (ATL)

Check the boxes for any explicit approaches to learning connections made during the unit. For more information on ATL, please see the guide.

☒ Thinking

☒ Social

☒ Communication

☒Self-management

☒ Research

Details: This topic provides students with a vast amount of information that can be studied in many ways. The ATLs used for this subtopic will vary depending on the individual students and groups approach to showing their understanding of the material.

Language and Learning *Check the boxes for any explicit language and learning connections made during the unit. For more information on the IB's approach to language and learning, please see the guide.*	**TOK Connections** *Check the boxes for any explicit TOK connections made during the unit*	**CAS Connections** *Check the boxes for any explicit CAS connections. If you check any of the boxes, provide a brief note in the "details" section explaining how students engaged in CAS for this unit.*
□ Activating background knowledge ☒ Scaffolding for new learning ☒ Acquisition of new learning through practice □ Demonstrating proficiency Details: *Students will acquire new vocabulary dealing the origin, threats, and conservation of biodiversity*	☒ Personal and shared knowledge ☒ Ways of knowing ☒ Areas of knowledge ☒ The knowledge framework Details: ❏ *The term "biodiversity" has replaced the term "nature" in much literature on conservation issues—does this represent a paradigm shift?* ❏ *Genetic diversity refers to the range of genetic material present in a population of a species.* ❏ *Diversity index is not a measure in the true sense of the word, but merely a number (index), as it involves a subjective judgment on the combination of two measures: proportion and richness. Are there examples in other areas of knowledge of the subjective use of numbers?* ❏ *The theory of evolution by natural selection tells us that change in populations is achieved through the process of natural selection—is there a difference between a convincing theory and a correct one?* ❏ *There may be long-term consequences when biodiversity is lost—should people be held morally responsible for the*	☒ Creativity ☒ Activity □ Service Details: *Students may apply creativity in their group and individual projects- species profile and creation of a children's book, song, game, etc that will teach the younger generation about the importance of biodiversity conservation* *Students will gain experience with outdoor surveying work through the ACFOR scale activity in the nature observatory.*

	❏ *long-term consequences of their actions?* ❏ *There are various approaches to the conservation of biodiversity—how can we determine when we should be disposed to act on what we know?*	

Resources

List and attach (if applicable) any resources used in this unit

- Oxford Environmental Systems and Societies ISBN 978-0-19-833256-5
- Biozone Environmental Science Student Workbook ISBN 978-1-927173-55-8
- Hodder Education Environmental Systems and Societies Study and Revision Guide ISBN 978-1-471-89973-7
- IB ESS Schoology Group

REFLECTION: considering the planning, process, and impact of the inquiry

What worked well	**What didn't work well**	**Notes / Changes / Suggestions**
List the portions of the unit (content, assessment, planning) that were successful	*List the portions of the unit (content, assessment, planning) that were not as successful as hoped*	*List any notes, suggestions, or considerations for the future teaching of this unit*

Conservation Island Activity to introduce the issues of land management (could extend/modify activity to add stakeholders or to give students different interests). IUCN species case study assignment and sharing. Provided students the opportunity to learn more about self-selected organisms and relate information to topic 3 and previous topics. Students appreciate topic review sheets.	Students still need more practice with command terms used in IB style assessment questions. Some students are still struggling with graph and chart reading for some types of figures. Students do well with maps or simple line and bar graphs, but struggle with more complex figures.	Increase outdoor collection of data. Consider moving this unit to early fall semester or late spring semester to provide more opportunities for field data collection. Include some crossover activities that highlight knowledge and skills used in other topics. Continue including time for IB command term practice and graph/chart/figure analysis.