IB Environmental Systems and Society (ESS) SL Year 1:

<table>
<tr><td>Teacher(s)</td><td>IB ESS PLC</td><td>Subject group and course</td><td colspan="3">Environmental Systems and Society (ESS)</td></tr>
<tr><td>Course part and topic</td><td>Soil and Food Production
5.1 Introduction to Soil Systems
5.2 Terrestrial food production systems and food choices
5.3 Soil Degradation and Conservation</td><td>SL or HL/Year 1 or 2</td><td>SL; Year 1</td><td>Dates</td><td>6 weeks</td></tr>
<tr><td colspan="2">Unit description and texts</td><td colspan="4">DP assessment(s) for unit</td></tr>
<tr><td colspan="2">In this unit students will be studying soil and food production.

Statement of Inquiry: All people are bound to the environment by eating organic material.

Phenomenon: Food reaches people through a complex global system that starts with water and soil and ends with consumption of food. Throughout this system many choices are made by societies and individuals which affects the short-term and long-term wellbeing of humanity.</td><td colspan="4">● Formative:
o Reading Quizzes
o Building Skills Assignments
o Mini-Case Study Infographics/Reports
o Lab Practical:
▪ Soil Core: Porosity, Percolation, Identification, Nutrients
▪ Investigating Growth IA Practice Lab
● Summative:
o Subtopic Quizzes (3)
o Case Studies:
▪ Comparing Farming Systems
▪ Food and Trophic Levels
o Unit Test</td></tr>
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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.***
SWBAT: Explain, test, and determine soil properties related to both biotic and abiotic processes. Compare choices in the global food system. Explain causes, processes and effects of soil degradation.

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> ● The soil system may be illustrated by a soil profile that has a layered structure. ● Soil system stores include organic matter, organisms, nutrients, minerals, air and water. ● Transfers of material within the soil include biotic mixing, leaching, and mobilization. ● Soils have inputs like leaf litter, clay and precipitation and outputs include biotic uptake and soil erosion. ● The structure and properties of sandy, loamy, and clay soils differ. ● The sustainability of terrestrial food production systems is influenced by many factors. ● Inequalities, cultural choices, availability of land, and technology all affect food production yields. ● Increased sustainability can be achieved by reducing meat consumption, improving food	Learning experiences and strategies/planning for self-supporting learning: ***Cornell reading notes*** Opening discussion ***Small group/pair*** ***work*** ***PowerPoint lecture/notes*** **Current Events Reading**

labeling, monitoring by intergovernmental bodies, and improvements in land use planning.

- Trophic level of harvested organisms has a large impact on food yields per unit area.
- Soil ecosystems change through ecological succession.
- Fertile soil contains a community of organisms that maintain nutrient cycles and resist soil erosion.
- Human activities which can reduce soil fertility include deforestation, intensive grazing, urbanization, irrigation, and monoculture.
- Commercial industrialized food production systems tend to reduce soil fertility more than small-scale subsistence farming methods, although both can be done wrong.
- Reduced soil fertility may result in soil erosion, toxification, salinization and desertification.
- Soil conservation measures exist such as: soil conditioners, wind reduction techniques, cultivation techniques, and avoiding use of marginal lands.

Students will develop the following skills:

- Outline the dynamic soil system in a system diagram.
- Explain the soil ecosystem.
- Compare and contrast soil structures and their effects on plants.
- Analyze tables and graphs that illustrate inputs, outputs, and transfers in food systems.
- Compare and contrast food production systems (case study)
- Evaluate environmental impacts of food production systems.
- Discuss the links between cultural systems and food systems.
- Evaluate strategies to increase sustainability in food production systems.
- Explain the relationship between ecosystem succession and soil fertility.
- Discuss the influences of human activities on soil fertility and soil erosion.
- Evaluate soil management strategies in a named commercial farming system and in a

Skills Activities

(Worksheets, Schoology assignments etc. systems diagrams, statistics, formulas, practice)

Case Studies

Lab Practicals

Details: Students will read assigned pages of the text at home through the schoology LMS. Class time will be dedicated to discussions, skills, investigations, and assessments.

Other/s:

Accommodations:

- *SWD/504 – Accommodations Provided*
- *ELL – Reading & Vocabulary Support*
- *Intervention Support*
- *Extensions – Go Further enrichment materials:*
  - *Documentary Reports*
  - *Assignments*
  - *Audio Programs*

named subsistence farming system. <u>Students will grasp the following concepts:</u> ● The soil system is a dynamic ecosystem that has inputs, outputs, storages and flows. ● The quality of soil influences the primary productivity of an area. ● The sustainability of food production systems is influenced by socio-political, economic and ecological factors. ● The supply of food is inequitably available and land suitable for food production is unevenly distributed. This can lead to conflict. ● Political, economic, and ethical choices throughout the food system play roles in determining outcomes for the environment and human society. ● Fertile soils require significant time to develop through the process of succession. ● Human activities may reduce soil fertility and increase soil erosion. ● Soil conservation strategies exist and may be used to preserve soil fertility and reduce soil erosion.	

Formative assessment: Reading quiz, in class skills practice, mini-case studies based on current events readings, sub-topic quizzes, lab practicals

Summative assessment: Summative Case-study assessments will mirror criteria described by the IB program. Unit test will mirror the IB exam students will take at the end of the year**.**

Differentiation:

- ***Mixed-ability group assignments***
- ***Scaffold group work – assigned roles***
- ***Scaffold learning/Extend learning***
- ***Video option for readings***

Details: Growth will be monitored using formative assessments by instructor and self-assessed using provided bulls-eye rubric. Remediation/ extension will be conducted through homework activities and investigations conducted in class.

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

Details:
The ATL for this unit is understanding. In Topic 2 of ESS students have to assimilate a broad variety of new ideas and present qualitative and quantitative data in ways that will be novel to them. The unit focuses on students' ability to assimilate and communicate new kinds of data in new ways.

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: This unit applies vocabulary acquired through previous courses. Proficiency will be assessed through formative and summative assessments.	Personal and shared knowledge Ways of knowing Areas of knowledge **The knowledge Framework** Details: Students will focus on the methodology (Systems and models) for the course.	Creativity **Activity** Service Details: Students will begin to engage in genuine ecology field work as they sample the nature area in quadrats for biomass estimations and with transects for diversity measurements.

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
- IB ESS Schoology Past Schoology Course
- Symphony of Soil

Reflection—considering the planning, process and impact of the inquiry

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