Marietta City Schools

2025-2026 District Unit Planner

Teacher(s)	IB ESS Y1- Glazebrook PLC: Glazebrook	**Subject group and course**	Environmental Systems and Society (ESS)		
Course part and topic	Unit 5- Interconnected Earth	**SL or HL/Year 1 or 2**	SL; Year 1	**Dates**	4 weeks- Semester 2

Unit description and texts	**DP assessment(s) for unit**
This unit explores how Earth's systems are interconnected through the study of ecosystems, emphasizing a systems-thinking approach. Across Topics 1–4, students investigate how energy flows, matter cycles, and human activities influence ecological structure and function at multiple scales. Through practical investigations and real-world case studies, learners develop the skills to analyze relationships within and between systems, evaluate environmental impacts, and propose sustainable solutions. The unit builds a foundational understanding of how changes in one part of a system can affect the whole, preparing students to think critically about environmental challenges. **Environmental systems and societies guide**	• 1 Formative quizzes • Design a mini field investigation and conduct • Peer review of mini field investigations • IA proposal practice

Statement of Inquiry:

Understanding ecosystems through systems thinking and investigation reveals the interconnections between humans and the environment.

Phenomenon:

Environmental change exposes complex system interactions that can be explored through observation and inquiry

Crosscutting Concepts:

- Interdependence of systems
- Stability and change

Core Ideas:

Topic 1: Foundations

- Perspectives shape human decision-making around environmental issues.
- Systems thinking allows for holistic understanding and modeling of environmental issues.
- Sustainability connects social, economic, and environmental dimensions of human activity.

Topic 2: Ecology

- Ecosystems are complex, dynamic systems of biotic and abiotic interactions.
- Energy flows and matter cycles underpin trophic structures and ecosystem productivity.
- Succession and zonation reveal how ecosystems respond to change over time and space.

Topic 3: Biodiversity and Conservation

- Biodiversity ensures ecosystem resilience and stability.
- Human activities threaten biodiversity, requiring conservation strategies and stakeholder engagement.

Topic 4: Water

- Water systems are finite and vulnerable to pollution and overuse.
  Sustainable water management is critical at both local and global scales.

SEPs:

- Asking Questions and Defining Problems
- Planning and carrying out investigations
- Analyzing & interpreting data
- Use mathematics and computational thinking

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:
At the end of this unit, students should be able to independently and effectively:

Apply systems thinking to analyze environmental issues

- Students will be able to explain how interactions between biotic, abiotic, and human factors influence ecosystem stability and change.

Evaluate human impacts and propose sustainable solutions

- Students will be able to use evidence to assess environmental issues and recommend solutions that balance environmental, social, and economic factors.

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.*

Students will know the following content:

Guiding Questions

- How are Earth's systems interconnected, and how can systems thinking help us understand them?
- How do interactions between biotic, abiotic, and human factors influence ecosystem stability and change?
- How do energy flow and matter cycling shape ecosystem structure and function?
- How do human activities impact biodiversity, water systems, and overall ecosystem health?
- How can we use scientific evidence to propose sustainable solutions to environmental challenges? (exponential vs logistic) help predict ecological outcomes under different environmental pressures?

Objectives / Understandings for Topic 4

- **Earth's systems are interconnected**, and changes in one system can have cascading effects on others. *(Topic 1: Foundations)*
- **Systems thinking helps us understand complex environmental issues** by focusing on relationships, interactions, and feedback within and between systems. *(Topic 1: Foundations)*
- **Sustainability requires balancing environmental, social, and economic factors** when making decisions about resource use. *(Topic 1: Foundations)*

- **Ecosystems are dynamic systems** shaped by interactions between biotic and abiotic factors over time and space. *(Topic 2: Ecology)*
- **Energy flows and matter cycles are fundamental processes** that determine ecosystem structure, productivity, and sustainability. *(Topic 2: Ecology)*

- **Biodiversity is essential for ecosystem resilience and stability**, and its loss can disrupt ecosystem function.

Learning experiences and strategies/planning for self-supporting learning:

Study Skills

- Teach study reading & Cornell notes
- Independent reading outside of class

Small group/pair work

- Jigsaw summaries
- Flexible grouping

Writing/Diagram-ing

- In-Class Practice

Interdisciplinary learning

The course is interdisciplinary by nature.

Other/s:

Accommodations:

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

(Topic 3: Biodiversity and Conservation)

- **Human activities significantly impact ecosystems**, often altering natural processes and reducing system stability.
  (Topic 3: Biodiversity and Conservation)

- **Water is a finite and unevenly distributed resource**, making sustainable management critical for ecosystems and human societies.
  (Topic 4: Water)

- **Scientific investigation and data analysis are essential tools** for understanding environmental systems and informing decisions.
  (Topics 1–4: Skills across all topics)
- **Effective solutions to environmental challenges require evidence-based reasoning and consideration of trade-offs**.
  (Topics 1–4: Applied across all topics)

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

- Analyze and interpret water data (e.g., availability, use, scarcity trends)
- Apply systems thinking to understand water stores, flows, and human impacts
- Evaluate water management strategies using environmental, social, and economic factors
- Use scientific evidence to propose sustainable solutions to water issues
- Communicate explanations and arguments clearly using data and key vocabulary

Formative assessment:

Formative assessments will be used throughout the unit to monitor student understanding and provide feedback, including quizzes, peer review of mini field investigations, and practice developing an IA proposal.

Summative assessment:

The summative assessment will require students to design and conduct a mini field investigation, applying their skills in data collection, analysis, and evaluation to a real-world environmental context.

Differentiation:

- ***Just-in-time reteaching from formative quizzes at the start of most class sessions***
- ***Scaffold learning*** *- teaching study skills and writing strategies as well as content*
- ***Extend learning*** *- authentic science writing & documentaries for advanced reading*

Details: Growth will be monitored using formative assessments by instructor. Remediation/ extension will be conducted through homework activities and investigations conducted in class. One on one tutoring offered to assist students needing additional assistance with material.

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.

1. Research Skills

- Students design and carry out investigations, collect data, and develop IA-style proposals.
- This directly aligns with your mini field investigation (summative) and IA proposal practice (formative)

2. Thinking Skills (Critical & Creative Thinking)

- Students analyze data, evaluate environmental issues, and propose sustainable solutions.
- This connects to systems thinking, evaluating water management strategies, and using evidence to justify decisions.

Language and learning	TOK connections	CAS connections
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.	*Check the boxes for any explicit TOK connections made during the unit*	*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.*

Explicit Language and Learning Connections Made During Topic 1

Topic 1 is rich in interdisciplinary vocabulary and conceptual language that helps students make connections across subjects and develop holistic environmental literacy. These connections include:

Key Vocabulary and Conceptual Terms:

- **Levels of Organization**: biosphere, ecosystem, community, population, species, niche (fundamental vs. realized).
- **Population Dynamics**: carrying capacity, limiting factors, exponential growth, logistic growth, r-strategists, K-strategists.
- **Energy Flow & Productivity**: trophic level, food chain, food web, gross productivity (GP), net productivity (NP), ecological pyramids, second law of thermodynamics.
- **Cycles & Matter**: carbon cycle, nitrogen cycle, water cycle, nutrient cycling.
- **Pollution & Human Impact**:

Theory of Knowledge (TOK) Connections for Topic 1

Topic 1 is deeply connected to TOK through the exploration of perspectives, ethics, and the production of knowledge about environmental systems.

TOK Knowledge Questions (KQs) Relevant to Topic 1:

- To what extent do models (e.g., population growth, food webs) represent reality in ecology?
- How do different cultures value ecosystems, and how does this shape what is considered "knowledge" about sustainability?
- What role does uncertainty play in ecological predictions?
- To what degree should ethical considerations guide ecological research?

Relevant Areas of Knowledge (AOKs):

- **Natural Sciences**: Ecological models, data

Explicit Learning and Language Connections Made During Topic 1

Learning Connection	Explanation
Systems Thinking in Sciences and Geography	Supports understanding of feedback, scale, and modeling environmental processes.
Ethical Reasoning in TOK and Philosophy	Connects to moral implications of sustainability and environmental justice.
Critical Literacy in Language and Social Studies	Enhances skills in interpreting environmental texts, media, and value positions.
Quantitative Reasoning in Math and Science	Needed for modeling systems, analyzing surveys, and calculating ecological data.
Cultural and Political Awareness in Civics	Explores governance, stakeholder roles, and worldview formation.
Personal Reflection and Communication Skills (ATL)	Encourages articulation of values, persuasive writing, and respectful dialogue.

bioaccumulation, biomagnification, non-biodegradable pollutants, microplastics, deforestation, ecosystem resilience.

- **Succession & Change**: seral stage, pioneer species, climax community, primary succession, secondary succession, resilience, stability.

Interdisciplinary Learning Links:

- **Biology**: Cellular respiration, photosynthesis, adaptations, genetic variation, population biology.
- **Chemistry**: Biogeochemical cycles, pollutants (DDT, PCBs, mercury), chemical transformations in ecosystems.
- **Mathematics**: Lincoln Index (population estimation), logistic vs. exponential growth curves, percentage calculations for energy transfer, data analysis from sampling.
- **Geography**: Biomes, land-use change, deforestation, human impacts on ecosystems, mapping succession/zonation.
- **Economics**: Ecosystem services,

collection, population studies.

- **Human Sciences**: Human impacts on ecosystems, social/economic drivers of deforestation.
- **Ethics**: Moral responsibility in managing ecological resources and biodiversity.

TOK Concepts Featured:

- Evidence, Certainty, Truth, Interpretation, Power, Justification, Explanation, Objectivity, Perspective, Culture, Values, Responsibility

Example TOK Activities:

- **Data reliability debate**: Students compare Lincoln Index field data vs. secondary population data; discuss knowledge claims about accuracy.
- **Succession thought experiment**: Compare ecological succession in nature vs. human-managed systems (farmlands, urban restoration).
- **Case study discussion**:

sustainable resource use, costs of deforestation, evaluating policies for conservation. • **Ethics/Philosophy**: Debates on ecological responsibility, environmental ethics, indigenous vs. industrialized value systems. **Literacy/Language Connections:** **Academic Language Development**: • Building discipline-specific vocabulary lists (e.g., bioaccumulation, trophic level, succession). • Sentence frames for CER writing: *"The data suggests that… This is because… Therefore, we can conclude that…"* **Reading Strategies**: • Simplified articles for ESOL learners on biomes and pollution. • Higher-level scientific journal excerpts for advanced learners on ecosystem resilience and succession. **Writing Skills**: • Lab reports (Lincoln Index, succession investigation) emphasizing precise use of terminology.	Bioaccumulation (DDT, mercury) — debate whether banning a chemical reflects scientific certainty, precaution, or ethical responsibility. • **Cultural lens analysis**: Compare indigenous vs. industrialized perspectives on carrying capacity and resource use.	

• Research essays (deforestation & cycles) integrating secondary sources with scientific argumentation. **Oral Language Practice**: • Structured debates (e.g., "Should governments prioritize economic development or biodiversity conservation?"). • Peer-to-peer teaching of key terms using diagrams and models. **Visual Literacy**: • Reading/constructing food webs, pyramids, population graphs, and zonation/succession diagrams.		

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 *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*