IB ESS Year 1 S1 - MHS Subject Group Overview

Unit Name	Unit 1 Foundations of ESS	Unit 2 Intro to Ecosystems	Unit 3 Human Systems and Sustainability	Unit 4 Soil and Food Production	Unit 5 Interconnected Earth
Time Frame	6 Weeks	12 Weeks	8 Weeks	6 weeks	4 weeks
Standards/ IB Topics	Topic 1 Foundations of ESS 1.1 – Perspectives 1.2 – Systems 1.3 – Sustainability	Topic 2 Ecology 2.1 –Individuals and populations, communities, and ecosystems 2.2- Energy and biomass in ecosystems 2.3- Biogeochemical cycles 2.4- Climate and Biomes 2.5- Zonation, succession and change in ecosystems	Topic 3 Biodiversity and Conservation 3.1- Biodiversity and evolution 3.2- Human impact on biodiversity 3.3- Conservation and regeneration	Topic 4 Water 4.1- Water systems 4.2- Water access, use and security 4.3- Aquatic food production systems 4.4- Water pollution	Topics 1-4 Interconnected Earth: Understanding Ecosystems Through Systems Thinking and Practical Investigation
Content Specific Information	**Statement of Inquiry** Understanding environmental perspectives, systems, and sustainability fosters holistic thinking and informed decision-making in addressing global environmental challenges. **<u>Phenomenon:</u>** People around the world respond very differently to the same environmental issues. These varied responses reflect underlying worldviews, value systems, and interpretations of scientific data. **Crosscutting Concepts** ● Systems and system models ● Cause and effect ● Stability and change Scale, proportion, and quantity**C**	**Statement of Inquiry** Ecosystems are dynamic systems whose stability depends on energy flow, species interactions, and responses to disturbance. **<u>Phenomenon:</u>** Coral reefs, once vibrant ecosystems, are increasingly experiencing bleaching events and biodiversity collapse. **Crosscutting Concepts** ● Systems and system models ● Energy and matter ● Stability and change ● Structure and function	**Statement of Inquiry** The preservation of biodiversity is influenced by ecological, ethical, political, and economic considerations. **<u>Phenomenon:</u>** Despite protection efforts, the orangutan remains critically endangered due to palm oil expansion. **Crosscutting Concepts** ● Patterns ● Stability and Change ● Cause and Effect ● Systems and system models	**Statement of Inquiry** Water is a finite resource whose quality and availability are influenced by human management and natural systems. **<u>Phenomenon:</u>** Despite abundant rainfall, millions globally lack access to clean drinking water. **Crosscutting Concepts** ● Systems and system models ● Cause and effect ● Stability and change	**Statement of Inquiry** Understanding ecosystems through systems thinking and investigation reveals the interconnections between humans and the environment. **<u>Phenomenon:</u>** Environmental change exposes complex system interactions that can be explored through observation and inquiry **Crosscutting Concepts**: ● Interdependence of systems ● Stability and change

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	SEPs ● Asking questions and defining problems ● Analyzing and interpreting data ● Engaging in argument from evidence ● Obtaining, evaluating, and communicating information **CORE IDEAS** **1.1 Perspectives:** ● Perspectives are shaped by sociocultural, scientific, religious, and economic factors. ● Environmental value systems (EVSs) influence behavior and decision-making. ● Perspectives change over time and context due to events, advocacy, and information. **1.2 Systems:** ● Systems have storages and flows and can be modeled to understand complexity. ● Feedback mechanisms influence system behavior. ● Models are useful but have limitations. **1.3 Sustainability:** ● Sustainability involves meeting present needs	**SEPs** ● Asking Questions and Defining Problems ● Developing & Using Models ● Analyzing & interpreting data ● Use mathematics and computational thinking ● Constructing Explanations ● Obtaining, evaluating and communicating information **CORE IDEAS** **2.1 Individuals, Populations, Communities, and Ecosystems** ● Populations consist of individuals of the same species living in the same area at the same time. ● Communities are groups of populations interacting within an ecosystem. ● Ecosystems include both biotic communities and abiotic components. ● Abiotic factors (e.g., light, temperature) and biotic factors (e.g., competition, predation) influence distribution. **2.2 Species Interactions** ● Organisms interact in ways that include predation, competition,	**SEPs** ● Asking Questions and Defining Problems ● Analyzing & interpreting data ● Constructing Explanations ● Obtaining, evaluating and communicating information ● Engage in Argument from Evidence **CORE IDEAS** **3.1 Biodiversity and Evolution** ● Biodiversity exists at genetic, species, and habitat levels. ● Evolution occurs through natural selection acting on variation. ● Speciation results from isolation and adaptation. ● Mass extinctions have historically reduced biodiversity. **3.2 Threats to Biodiversity** ● Biodiversity is threatened by habitat loss, invasive species, pollution, overexploitation, and climate change. ● IUCN Red List assesses species' extinction risk using criteria like population size and decline.	**SEPs** ● Developing & Using Models ● Analyzing & interpreting data ● Use mathematics and computational thinking ● Engage in Argument from Evidence **CORE IDEAS** **4.1 Water Systems** ● The hydrological cycle includes processes like evaporation, precipitation, infiltration, and runoff. ● Ocean currents (e.g., thermohaline circulation) redistribute heat and influence climate. ● Human activities like damming and deforestation alter the water cycle. **4.2 Water Access, Use, and Security** ● Access to clean water varies globally and is influenced by social, political, and economic factors. ● Water is used for	**SEPs** ● Asking Questions and Defining Problems ● Planning and carrying out investigations ● Analyzing & interpreting data ● Use mathematics and computational thinking **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

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	without compromising future generations. ● Natural capital and ecosystem services are essential. ● Sustainability indicators and ecological footprints help measure environmental impact.	mutualism, parasitism, and commensalism. ● A species' ecological niche includes its habitat, role, and interactions. ● Keystone species play a critical role in maintaining ecosystem structure. **2.3 Energy in Ecosystems** ● Energy flows through ecosystems from producers to consumers and decomposers. ● Food chains and food webs show energy transfer. ● Energy decreases at each trophic level due to loss as heat (10% rule). **2.4 Biogeochemical Cycles** ● Water, carbon, nitrogen, and phosphorus cycle through ecosystems. ● Key processes include evaporation, photosynthesis, nitrogen fixation, and decomposition. ● Human activity (e.g., deforestation, agriculture) disrupts	● Human activities influence ecosystem services and species survival. ● Indigenous and local knowledge contribute to understanding and protecting biodiversity. **3.3 Conservation and Regeneration** ● Conservation methods include in situ (protected areas) and ex situ (zoos, seed banks) strategies. ● Biosphere reserves aim to balance conservation and sustainable use. ● Wildlife corridors help species movement and reduce habitat fragmentation. ● Conservation success can be measured ecologically, socially, and economically.	agriculture, industry, and domestic needs. ● Inequitable access leads to water insecurity and conflict. **4.3 Water Pollution** ● Pollution can be point-source (e.g., factory) or non-point source (e.g., runoff). ● Common pollutants include nutrients, heavy metals, pathogens, and plastics. Pollution harms aquatic ecosystems, biodiversity, and human health. **4.4 Water Quality and Monitoring** ● Water quality is assessed using abiotic indicators (e.g., pH, temperature) and biotic indices (e.g., indicator species). ● Water quality indices (e.g., WQI) combine data to evaluate overall condition.	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

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		natural cycles. **2.5 Succession and Ecosystem Stability** ● Succession is a natural process of ecological change over time. ● Primary succession starts from bare substrate; secondary follows disturbance. ● Biodiversity, productivity, and resilience increase with succession. ● Human activities can interrupt or redirect succession (e.g., agriculture, grazing).		● Legal and community actions play a role in monitoring and improving water quality.	critical at both local and global scales.
Common Assessments / Major Projects	1 Summative unit assessment 2 Formative quizzes Who am I? Environmental values activity Cultural attitudes jigsaw It takes a disaster timeline World view debate- Anthropocentrism vs ecocentrism Dakota access pipeline case study Global perspectives poster campaign Pancake systems modeling	2 Summative unit assessments 3 Formative quizzes Midterm Lincoln index to estimate population size Carrying capacity/limiting factor activity Bioaccumulation simulation and modeling Deforestation and impacts of biogeochemical cycles research Succession investigation	1 Summative unit assessment 2 Formative quizzes Biodiversity and conservation project Biodiversity case study Solving the extinction crisis debate Mapping biodiversity hotspots Ecocentric vs technocentric conservation debate	1 Summative unit assessment 2 Formative quizzes Bottle water case study Colorado river case study Tragedy of the commons activity and discussion Water pollution impacts on biodiversity	Final exam 1 Formative quizzes Design a mini field investigation and conduct Peer review of mini field investigations IA proposal practice

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Level Specific Differentiation	Marietta City Schools teachers provide specific differentiation of learning experiences for all students. Details for differentiation for learning experiences are included on the district unit planners.				Graded on IB scale by mark scheme
Resources	• 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	• 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	• 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	• 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	• Biozone Environmental Science Student Workbook • Hodder Education Environmental Systems and Societies Study and Revision Guide • IB ESS Schoology Course Resources