Environmental Systems and Societies for the IB Diploma

Second edition
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Introduction

This book covers the syllabus for the IB Diploma Programme Environmental Systems and Societies, which is offered at Standard Level only. Our understanding of the environment and its importance to our lives has grown rapidly over recent decades and the Environmental Systems and Societies course, which is a transdisciplinary subject combining the knowledge and techniques associated with a group 4 science subject and the social and cultural aspects of the more anthropocentric approach of a group 3 subject.

The book follows the sequence of the syllabus in terms of the eight topics and the sub-sections within these topics. The overall objective of this book is to provide comprehensive coverage of all the topics in the syllabus in an up-to-date and interesting format. Each topic is covered in a separate section and the significant ideas and key questions are listed at the start of each section. Case studies have been chosen to represent a wide range of geographical locations and biological examples, so that as you read, you can reflect on the essential international element of this course. Examples from across the environmental and economic spectrums highlight how our impact on the environment is not just an issue for one country or section of society but something important to us all. The book considers a range of environmental issues from small-scale local events to large-scale global issues. The use of ICT and technology in general has made all of us more aware than ever before of what is happening elsewhere in the world and of the implications that changes in other parts of the world can have on us.

**Topic 1** Foundations of environmental systems and societies explains the environmental value systems that drive societies to protect and value the natural world. It outlines the essential systems approach to the study of this subject, identifying some of the underlying principles that can be applied to living systems. Your syllabus advocates a holistic approach to the analysis of environmental systems so that you can arrive at informed personal viewpoints while being aware of the values of others. The topic introduces important concepts of energy, sustainability and the impact of humans on the environment.

**Topic 2** Ecosystems and ecology presents much of the basic scientific knowledge and understanding for the topics that follow. Techniques to measure and evaluate components of systems and how they can change are central to this topic which also covers the key concepts of species, populations, biomes and succession.

**Topic 3** Biodiversity and conservation addresses issues of how biodiversity has arisen and how it is now under threat, mainly because of human interference in natural systems. Humans are attempting to redress the balance and some conservation options are covered here.

**Topic 4** Water and aquatic food production systems and societies considers how access to fresh water is crucial to the survival of all living things. Humans use aquatic systems to harvest and produce food; as our population increases so do our demands on these resources. Fish farming and aquaculture may help feed future generations. Pollution of water is a problem discussed here.

**Topic 5** Soil systems and terrestrial food production systems and societies provides detailed coverage of the planet’s soils in terms of systems, structure, how they are used for human benefit, and how their misuse is storing up major problems for the future. Understanding all aspects of soil systems around the world is fundamental to ensure food security for present and future populations. The topic begins with an introduction to soil systems, followed by consideration of terrestrial food production systems and food choices, and ends with analysis of soil degradation and conservation.

**Topic 6** Atmospheric systems and societies begins with an introduction to the atmosphere which provides a basis for this topic and also for Topic 7. The three following sub-topics in Topic 6 consider major atmospheric issues which impact severely on people and the environment and may cumulatively threaten the future liveability of the planet. This topic examines the extent of these atmospheric problems and considers progress made in their management.

**Topic 7** Climate change and energy production examines what is generally considered to be the number one problem facing planet Earth. The opening sub-topic sets the scene by acknowledging that production and consumption of energy are by far the most important factors in climate change. The concept of ‘security’ again comes to the fore, as it also does in Topic 4 (water) and
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Topic 5 (food). If significant further progress is to be made in tackling climate change, we will need to be reliant on a higher level of international cooperation than has been the case in the past along with significant advances in science and technology.

Topic 8 Human systems and resource use begins with an analysis of human population dynamics which considers the models and indicators used to quantify human populations, and the range of factors which affect human population growth. The topic then examines resource use in society, solid domestic waste, and human population carrying capacity. The important concept of the ecological footprint (EF) is discussed. The key concept of sustainability is central to this topic as it is to the study of environmental systems and societies in general.

The phrase ‘Think globally, act locally’ was first used by Scottish town planner and social activist Patrick Geddes, who wrote *Cities in Evolution* in 1915. It has since become a concept widely used by environmentalists and taken into consideration by governments, educators and communities. It is an idea on which we can all reflect in our daily lives and at the end of this book.

Full details of the Assessment Objectives and examination requirements for the Diploma Programme Environmental Systems and Societies course can be found in the relevant IBO guide.

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How to use this book

Introduction to water systems

LEARNING OBJECTIVES
After reading this chapter you should be able to:
• understand that the hydrological cycle is a system of water flows and storages that may be disrupted by human activity
• appreciate that the ocean circulatory system (ocean conveyor belt) influences the climate and global distribution of water (matter and energy).

KEY QUESTIONS
How does water flow and how is it stored in the hydrological cycle?
How do human activities impact on surface runoff and infiltration?
What impact does the ocean circulation system have on the global distribution of water?

Self-assessment questions – check your own knowledge and see how well you’re getting on by answering questions. Each set of self-assessment questions includes a discussion point or research idea offering the opportunity for more extensive investigation and group work.

Consider this – particularly interesting aspects of each topic are highlighted throughout each chapter, providing extra opportunities for discussion in class.

Key terms – clear and straightforward explanations of the most important words in each topic.

Learning objectives and key questions – set the scene of each chapter, help with navigation through the book and give a reminder of what’s important about each topic.
How to use this book

Theory of knowledge - allow you to reflect on the central role of Theory of knowledge on our knowledge and understanding of environmental philosophy. Each one asks you to consider a question which could form the basis of group discussion or a homework task.

Case studies - fascinating real-world settings are described and discussed to illustrate environmental phenomena that are relevant internationally. Questions allow you to check your knowledge and understanding.

End-of-topic questions - use the questions at the end of each topic to check your knowledge and understanding of the whole topic and to practise answering questions similar to those you will encounter in your exams.