Summary

Topic 8 Human systems and Resource Use

Subject	Year	Start date	Duration
Environmental Systems & Societies	IB1, IB2	Week 1, March	6 weeks 16 hours

Course Part

Core

Curriculum

Aims

Acquire the knowledge and understandings of environmental systems at a variety of scales

Apply the knowledge, methodologies and skills to analyse environmental systems and issues at a variety of scales

Appreciate the dynamic interconnectedness between environmental systems and societies

Value the combination of personal, local and global perspectives in making informed decisions and taking responsible actions on environmental issues

Be critically aware that resources are finite, and that these could be inequitably distributed and exploited, and that management of these inequities is the key to sustainability

Develop awareness of the diversity of environmental value systems

Develop critical awareness that environmental problems are caused and solved by decisions made by individuals and societies that are based on different areas of knowledge

Engage with the controversies that surround a variety of environmental issues

Create innovative solutions to environmental issues by engaging actively in local and global contexts

Objectives

Demonstrate knowledge and understanding of relevant

- facts and concepts
- methodologies and techniques
- values and attitudes

Apply this knowledge and understanding in the analysis of

- explanations, concepts and theories
- data and models

case studies in unfamiliar contexts

arguments and value systems

Evaluate, justify and synthesise, as appropriate

explanations, theories and models

arguments and proposed solutions

methods of fieldwork and investigation

cultural viewpoints and value systems

Engage with investigations of environmental and societal issues at the local and global level through

evaluating the political, economic and social contexts of issues

selecting and applying the appropriate research and practical skills necessary to carry out investigations

suggesting collaborative and innovative solutions that demonstrate awareness and respect for the cultural differences and value systems of others

Syllabus Content

Topic 8: Human systems and resource use

8.1 Human population dynamics

Significant ideas:

A variety of models and indicators are employed to quantify human population dynamics.

Human population growth rates are impacted by a complex range of changing factors.

Knowledge and understanding:

Demographic tools for quantifying human population include crude birth rate (CBR), crude death rate (CDR), total fertility rate (TFR), doubling time (DT) and natural increase rate (NIR).

Global human population has followed a rapid growth curve, but there is uncertainty as to how this may be changing.

As the human population grows, increased stress is placed on all of the Earth's systems.

Age–gender pyramids and demographic transition models (DTM) can be useful in the prediction of human population growth. The DTM is a model that shows how a population transitions from a pre-industrial stage with high CBRs and CDRs to an economically advanced stage with low or declining CBRs and low CDRs.

Influences on human population dynamics include cultural, historical, religious, social, political and economic factors.

National and international development policies may also have an impact on human population dynamics.

Applications and skills:

Calculate values of CBR, CDR, TFR, DT and NIR.

Explain the relative values of CBR, CDR, TFR, DT and NIR.

Analyse age–gender pyramids and diagrams showing demographic transition models.

Discuss the use of models in predicting the growth of human populations.

Explain the nature and implications of growth in human populations.

Analyse the impact that national and international development policies can have on human population dynamics and growth.

Discuss the cultural, historical, religious, social, political and economic factors that influence human population dynamics.

8.2 Resource use in society

Significant ideas:

The renewability of natural capital has implications for its sustainable use.

The status and economic value of natural capital is dynamic.

Knowledge and understanding:

Renewable natural capital can be generated and/or replaced as fast as it is being used. It includes living species and ecosystems that use solar energy and photosynthesis, as well as non-living items, such as groundwater and the ozone layer.

Non-renewable natural capital is either irreplaceable or can only be replaced over geological timescales; for example, fossil fuels, soil and minerals.

Renewable natural capital can be utilized sustainably or unsustainably. If renewable natural capital is used beyond its natural income this use becomes unsustainable.

The impacts of extraction, transport and processing of a renewable natural capital may cause damage, making this natural capital unsustainable.

Natural capital provides goods (such as tangible products) and services (such as climate regulation) that have value. This value may be aesthetic, cultural, economic, environmental, ethical, intrinsic, social, spiritual or technological.

The concept of a natural capital is dynamic. Whether or not something has the status of natural capital, and the marketable value of that capital varies regionally and over time and is influenced by cultural, social, economic, environmental, technological and political factors. Examples include cork, uranium and lithium.

Applications and skills:

Outline an example of how renewable and non-renewable natural capital has been mismanaged.

Explain the dynamic nature of the concept of natural capital.

8.3 Solid domestic waste

Significant ideas:

Solid domestic waste (SDW) is increasing as a result of growing human populations and consumption.

Both the production and management of SDW can have significant influence on sustainability.

Knowledge and understanding:

There are different types of SDW, the volume and composition of which changes over time.

The abundance and prevalence of non-biodegradable pollution (such as plastic, batteries or e-waste) in particular has become a major environmental issue.

Waste disposal options include landfills, incineration, recycling and composting.

There are a variety of strategies that can be used to manage SDW influenced by cultural, economic, technological and political barriers. These strategies include:

altering human activity—for example, through a reduction of consumption and composting of food waste.

controlling the release of pollutant—governments create legislation to encourage recycling and reuse initiatives and impose taxes for SDW collection and on disposable items

reclaiming landfills, using SDW for waste-to-energy programmes, implementing initiatives to remove plastics from the Great Pacific garbage patch (clean-up and restoration).

Applications and skills:

Evaluate SDW disposal options.

Compare and contrast pollution management strategies for SDW.

Evaluate, with reference to figure 3, pollution management strategies for SDW by considering recycling, incineration, composting and landfills.

8.4 Human population carrying capacity

Significant ideas:

Human carrying capacity is difficult to quantify.

The EF is a model that makes it possible to determine whether human populations are living within carrying capacity.

Knowledge and understanding:

Carrying capacity is the maximum number of a species, or “load”, that can be sustainably supported by a given area.

It is possible to estimate the carrying capacity of an environment for a given species; however, this is problematic in the case of human populations for a number of reasons.

An EF is the area of land and water required to support a defined human population at a given standard of living. The measure of an EF takes into account the area required to provide all the resources needed by the population, and the assimilation of all wastes.

EF is a model used to estimate the demands that human populations place on the environment.

EFs may vary significantly by country and by individual and include aspects such as lifestyle choices (EVS), productivity of food production systems, land use and industry. If the EF of a human population is greater than the land area available to it, this indicates that the population is unsustainable and exceeds the carrying capacity of that area.

Degradation of the environment, together with the consumption of finite resources, is expected to limit human population growth.

If human populations do not live sustainably, they will exceed carrying capacity and risk collapse.

Applications and skills:

Evaluate the application of carrying capacity to local and global human populations.

Compare and contrast the differences in the EF of two countries.

Evaluate how EVSs impact the EFs of individuals or populations.

ATL Skills

Approaches to Learning

Thinking

- In this unit, we will

  ask students to formulate a reasoned argument to support their opinion or conclusion

  give students time to think through their answers before asking them for a response

  reward a new personal understanding, solution or approach to an issue

  ask open questions

  set students a task which required higher-order thinking skills (such as analysis or evaluation)

  build on a specific prior task

  help students to make their thinking more visible (for example, by using a strategy such as a thinking routine)

  require students to take an unfamiliar viewpoint into account when formulating arguments

  ask questions that required the use of knowledge from a different subject from the one you are teaching

  include a reflection activity

  make a link to TOK

Social

- In this unit, we will

  have students work in small groups

  allocate, or ask students to allocate among themselves, different roles in a classroom discussion or activity

  have students peer assess their group performance or process

  support students in resolving a conflict in a team

  give a group assessment task

  give students feedback on how they worked as a group

  have students discuss their understanding of a text or idea among themselves and come up with a shared understanding

  provide an opportunity for students to analyse the impact of their behaviour on the class or on a group performance

  encourage students to consider alternative points of view or to take the perspective of others

  provide opportunities for students to make decisions

Developing IB Learners

Learner Profile


Inquirers


Knowledgeable


Thinkers


Reflective