

# EXTENDED ESSAY: ENVIRONMENTAL SYSTEMS AND SOCIETIES

## OVERVIEW

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Environmental issues occupy a position of increasing significance on the world agenda. An EE in environmental systems and societies gives students an opportunity to explore an environmental topic of particular interest to them.

Since the subject is interdisciplinary, the student will need to select and integrate theoretical contexts and methodologies with those academic disciplines appropriate to the chosen topic.

In this respect, a systems approach is particularly effective, and students will be expected to use this approach in the analysis and interpretation of their data.

## CHOICE OF TOPIC

[https://ibpublishing.ibo.org/extendedessay/apps/dpapp/guidance.html?doc=d\\_0\\_eeyvy\\_gui\\_1602\\_1\\_e&part=8&chapter=2&section=2](https://ibpublishing.ibo.org/extendedessay/apps/dpapp/guidance.html?doc=d_0_eeyvy_gui_1602_1_e&part=8&chapter=2&section=2)

Environmental systems and societies focuses upon the interaction and integration of “natural” environmental systems and human societies. An EE in this subject should give significant (though not necessarily equal) weight to both these dimensions.

The topic should allow the student to demonstrate some grasp of how environmental systems and societies function together. For example:

- studying pure ecological principles within the context of human interaction with the environmental system
- addressing philosophical approaches to the environment in relation to specific natural systems.

Students must ensure that their topic would not be better submitted under one of the specialized subject areas of the experimental or the human sciences. For example, topics focusing exclusively on human health, disease or politics are usually more appropriate to a single-discipline essay.

The topic must be open to analytical argument. If it lends itself only to a descriptive or narrative treatment, the student will be unable to achieve marks for critical thinking in the assessment criteria.

For example, it would be of minimal value simply to **describe** a given nature reserve. Instead, the topic should involve an **evaluation** of the reserve’s relationship with a local community, or a **comparison** of its achievement with its original objectives or with those of another conservation initiative.

The topic must enable students to construct and support an argument from their own analysis of the information, rather than simply reporting others’ analysed data.

Some topics are unsuitable for ethical or safety reasons, such as those requiring experiments that might:

- inflict pain on living organisms
- cause unwarranted environmental damage
- put pressure on others to behave unethically.

Experiments that pose a threat to health, possibly using toxic or dangerous chemicals, or putting oneself at physical risk during fieldwork, must also be avoided unless adequate safety apparatus and qualified supervision are available.



Students must adhere to the [IB animal experimentation policy](#) . They must familiarize themselves with this before undertaking an EE in environmental systems and societies.

The topic must have a sharp focus. If it is too broad, it will inevitably lead to a relatively superficial treatment that is likely to self-penalize the student from the start.

In topics that are too broad, it is unlikely that students will be able to produce any significantly fresh analysis, arguments or meaningful conclusions of their own.

### Examples of topics

These examples are just for guidance. Students must ensure their choice of topic is focused (left-hand column) rather than broad (right-hand column).

 <b>Focused topics</b>	 <b>Broad topics</b>
The ecological recovery of worked-out bauxite quarries in Jarrahdale, Western Australia	Environmental effects of mining
A comparison of the energy efficiency of grain production in the Netherlands and Swaziland	Efficiency of world food production
The comparative significance of different sources of carbon dioxide pollution in Nairobi and Mombasa	Impacts of global warming
Managing the environmental impact of paper use at a school in Quito (Ecuador)	Paper recycling

## TREATMENT OF THE TOPIC

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Students can investigate their question by:

- primary data collection, eg from fieldwork, laboratory experimentation, surveys or interviews
- secondary data collection, eg from literature or other media
- a combination of primary and secondary data collection.

If collecting primary data, the student needs to select appropriate methods to do this and carry them out effectively.

### Literature review

All students must demonstrate that they have engaged in background reading on their topic, regardless of their method of research.

### Primary data

Before beginning the investigation, students should read about the different methods of collecting data and any pertinent research that may give them guidelines and useful points of theoretical comparison.

Students' reading should be evident both in their essay and its bibliography. They can refer to what they have read to support their choice of methods or provide an academic context for their conclusions.

### Secondary data

If the essay is focused on secondary data, students need to ensure their sources are:

- of a sufficient quantity and range
- all reliable.

Students should use only those sources that have academic credibility, whether in print or online. Their bibliography should be substantial, not limited to just a few sources.

### Analysis

Whatever their sources of data, students must produce their own analysis and argue their own conclusions.

For some students this will happen more naturally if the essay is based on primary data.

If students are using secondary data, they must disregard any earlier analysis and conclusions. It is essential that students manipulate the data in their own way, or possibly synthesize it with other sources, in order to support their own research question.

### Using the systems approach

The systems approach is a central theme in the environmental systems and societies syllabus and this should be reflected to some degree in the EE. The essay should include an attempt to model, at least partially, the system or systems in question.

The term “model” in this context includes, for example:

- mathematical formulas
- maps
- graphical representations
- flow diagrams.

Students should also use the terminology from the environmental systems and societies course, where appropriate.

### Examples of topics, research questions and suggested approaches

Once students have identified their topic and written their research question, they can decide how to research their answer. They may find it helpful to write a statement outlining their broad approach. These examples are for guidance only.

<b>Topic</b>	<b>The ecological footprint of the school cafeteria</b>
<b>Research question</b>	What overall estimate of the environmental impact of the school cafeteria can be made in terms of an ecological footprint?
<b>Approach</b>	An analysis of records and practical measurements assessing the inputs and outputs of the cafeteria, and a synthesis of data into a holistic model indicating the environmental impact.

<b>Topic</b>	<b>Architectural sustainability and the future of Vancouver Island</b>
<b>Research question</b>	What forms of sustainable construction may be utilized in the future on Vancouver Island (Canada)?

<b>Approach</b>	An analysis of current sustainable building techniques and comparison of the environmental impacts of two options of sustainable housing.
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<b>Topic</b>	<b>Revival of the gray wolf in the National Forest of Colorado</b>
<b>Research question</b>	Is the reintroduction of <i>Canus lupus</i> in the Pike and Isabel National Forests of Colorado (USA) possible, even with a significant cattle presence?
<b>Approach</b>	Presenting a potential reintroduction area and analysing, using secondary data, the viability of wolf introduction within the proposed area.

<b>Topic</b>	<b>Comparing air pollution levels between a rural and an urban area in the UK</b>
<b>Research question</b>	Is there a significant difference in air quality between central Cambridge and Sawston (UK)?
<b>Approach</b>	A fieldwork investigation using data loggers and probes to collect data. Comparison of the results with secondary data from different regions.

### An important note on “double-dipping”

Students must ensure that their EE does not duplicate other work they are submitting for the Diploma Programme.

### The environmental studies EE and internal assessment

In particular, an EE in environmental studies is not an extension of the internal assessment (IA) task. Students must ensure that they understand the differences between the two.

- For the IA there is a specific requirement to address a broad issue from the course and to develop a focused research question based on this issue. For the EE there is a greater emphasis on a detailed literature review that leads onto the research question.
- For the IA the findings of the study must be applied to offer a solution or proposal to address the broad issue initially identified by the student. This stage is not required for the EE.
- The IA is limited to a maximum of 2,250 words and therefore the scope of the investigation is smaller.

**Supervisors play an important role here in guiding students on these distinctions. Students risk their diploma if academic misconduct is detected.**

## **INTERPRETING THE ASSESSMENT CRITERIA**

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### **Criterion A: Focus and method**

**(Strands: Topic, Research question, Methodology)**

- An EE in environmental systems and societies should focus upon the interaction of the natural environment and human societies. Students must ensure that the topic would not be better submitted under a subject area within the experimental or human sciences.
- The topic should be precise and focused and clearly established in the research question, which must be posed as a question. For example, “The potential of residential solar power systems to meet the demands in Canberra, Australia” is better than “Efficiency of solar energy”.
- The research question should not be understood as a statement of the topic but rather as a specifically expressed question that the research will attempt to answer. It leads on from the topic area chosen, for example: “To what extent can residential solar power systems meet the energy demands in Canberra, Australia?”
- The question must encourage critical argument rather than a descriptive or narrative response.
- Students should explain the significance of the research and indicate how the research question relates to existing knowledge.
- They also need to demonstrate that the research has been well planned and that they have selected an appropriate approach to address the research question.
- If the approach involves experimentation or practical fieldwork, a detailed description of the methodology used should be provided that would allow the work to be repeated.
- The sources consulted must be sufficient and each must contribute to the research focus of the essay.
- If the study is based on secondary data, students need to ensure that the selection of sources is wide and reliable. Students must be particularly aware of the potential unreliability of internet-based sources.

## **Criterion B: Knowledge and understanding**

### **(Strands: Context, Subject-specific terminology and concepts)**

- The EE must demonstrate an effective understanding of the place of the research question in a broader environmental systems and societies context. For example, in an essay on the effects of a specific human activity on the environment, the student may use repeated measurements on the ground, satellite images or maps.
- Students should show clear and perceptive links between their own study and the body of theoretical knowledge associated with the subject. The literature cited should predominantly come from acknowledged scientific sources and be applied effectively to support the student’s argument.
- Students need to show fluency in the use of appropriate environment-related terminology and avoid excessive use of jargon. Any technical terms that are used should be clearly explained. The student must demonstrate an understanding of these terms by using them appropriately within the text.
- Students should maintain a consistent linguistic style throughout the essay.
- Students are expected to use appropriate scientific and systems terminology, as employed in the [Environmental systems and societies guide](#).

## **Criterion C: Critical thinking**

### **(Strands: Research, Analysis and Discussion and evaluation)**

Students can carry out their research using:

- data taken from literature sources
- data they have collected themselves.

Their research must be consistently relevant to the research question.

There should be a clear step-by-step and logical argument linking the raw data to the final conclusions.

Students can demonstrate analytical skills in the selection, manipulation and presentation of any quantitative or qualitative data that they collect. These skills are well displayed in graphical representations, mathematical manipulations or flow diagrams.

Analytical skills may also be evident in the student's ability to:

- select specific data from sources
- identify the data's relevance and relationships to one another
- reorganize the data to support an effective verbal argument.

Evaluative skills will be apparent in the students' reflections on the reliability and validity of the data gathered, and their subsequent interpretations.

Students should not select essays in which ideas are presented as a simple list of the pros and cons of the topic followed by an overall summary as this shows a lack of true analysis. For example, essays comparing two different sources of energy tend to be largely descriptive in nature with no real argument. These do not provide any evidence of analytical skills and will therefore be compromised under this assessment criterion.

Students can include their person opinions but must substantiate them with available evidence.

Students must evaluate their own research, particularly in terms of unresolved issues and further research questions that may be generated by their study.

## **Criterion D: Presentation**

### **(Strands: Structure, Layout)**

- This criterion relates to the extent to which the essay conforms to accepted academic standards in relation to how research papers should be presented. It also relates to how well these elements support the reading, understanding and evaluation of the essay.
- Students should provide a section and subsection structure to their essays, with appropriate informative headings.
- Any charts, images or tables from literature sources included in the essay must be carefully selected labelled and referenced. They should only be used if they are directly relevant to the research question, contribute towards the understanding of the argument and are of a good graphic quality.
- Large tables of raw data collected by the student are best included in an appendix, where they should be carefully labelled. Tables of processed data should be designed to clearly display the information in the most appropriate form. Graphs or charts drawn from the analysed data should be selected to highlight only the most pertinent aspects related to the argument. Too many graphs, charts and tables will distract from the overall quality of the communication. Only processed data that is central to the argument of the essay should be included in the body of the essay, as close as possible to its first reference. Tables should enhance a written explanation; they should not themselves include significant bodies of text. If they do, then these words must be included in the word count.
- If an experimental method is long and complex, students may place the protocol in an appendix and just include a summary of the methods in the body of the essay. Students who choose this option must ensure that the summary contains all elements that contribute to the quality of the investigation, since appendices are not an essential section of the EE and examiners are not required to read them. In other words, any important information that contributes to the evaluation of the method must be in the body of the essay and not the appendix.
- For experiments where numerical results are calculated from data obtained by changing one of the variables, it is generally good practice to show one example of the calculation in the main body of the essay. The remainder can be displayed in tabular or graphical form.
- A bibliography is an essential structural element, contributing as far as it is visually presented, to criterion D, in addition to the other presentation requirements: title page, table of contents, page numbers, and so on.
- While there is no explicit penalty in criterion D for exceeding 4,000 words, students should be aware that examiners will not read beyond the 4,000-word limit, therefore affecting the application of multiple criteria.

Criterion D specifically may be impacted if, in exceeding 4,000 words, one of the structural requirements of the essay (for example, the conclusion, or important illustrative material) is unassessed by the examiner because he or she is not required to read beyond 4,000 words.

- Any material that is not original must be carefully acknowledged, with specific attention paid to the acknowledgement and referencing of quotes and ideas. This acknowledgment and referencing is applicable to audiovisual material, text, graphs and data published in print and electronic sources. If the referencing does not meet the minimum standard as indicated in the guide (name of author, date of publication, title of source and page numbers, as applicable), and is not consistently applied, work will be considered as a case of possible academic misconduct. Incomplete references and those that do not meet the minimum requirements as detailed in the *Effective citing and referencing* document are not penalized in criterion D, but examiners are required to alert the IB to candidates who overlook these minimum requirements, for further investigation. Criterion D assesses references and bibliography purely on how they are presented (for example, consistent, laid out in an appropriate academic manner).

## Criterion E: Engagement

### (Strands: Reflections on planning and progress)

This criterion assesses the student's engagement with their research focus and the research process. It will be applied by the examiner at the end of the assessment of the essay, and is based solely on the candidate's reflections as detailed on the [RPPF](#), with the supervisory comments and extended essay itself as context.

Students are expected to provide reflections on the decision-making and planning process undertaken in completing the essay. Students must demonstrate how they arrived at a topic as well as the methods and approach used. This criterion assesses the extent to which a student has evidenced the rationale for decisions made throughout the planning process and the skills and understandings developed.

For example, students may reflect on:

- the approach and strategies they chose, and their relative success
- the [Approaches to learning](#) skills they have developed and their effect on the student as a learner
- how their conceptual understandings have developed or changed as a result of their research
- challenges they faced in their research and how they overcame these
- questions that emerged as a result of their research
- what they would do differently if they were to undertake the research again.

Effective reflection highlights the journey the student has engaged in through the EE process. Students must show evidence of critical and reflective thinking that goes beyond simply describing the procedures that have been followed.

The reflections must provide the examiner with an insight into **student** thinking, creativity and originality within the research process. The **student** voice must be clearly present and demonstrate the learning that has taken place.