

## ENVIRONMENTAL SYSTEMS AND SOCIETIES

### Overall grade boundaries

<b>Grade:</b>	E	D	C	B	A
<b>Mark range:</b>	0 - 7	8 - 15	16 - 22	23 - 28	29 - 36

### General comments

The multidisciplinary nature of the subject makes environmental systems and societies an ideal subject for exploring an environmental topic or issue of particular interest for the candidates or relevance for their communities. A systems approach is considered particularly effective, and students would be expected to show some employment of this approach in the analysis and interpretation of the data gathered. The extended essay is a unique opportunity for diploma candidates to do independent research but the supervisor plays a key role during several stages of the extended essay.

### The range and suitability of the work submitted

This is the first year for the new general assessment criteria and subject specific guidelines and they are applicable with ease to extended essays in this subject. The guidelines state that the extended essay must refer to both ecosystems and human societies, and most extended essays did this. However, the downfall of many was the breadth of the research question which could never be properly addressed in the length of the essay. Many focused on climate change and its global effects, becoming a descriptive essay with no analysis and scant evaluation.

The best essays tend to have two things in common; the student has a genuine curiosity or interest about the selected topic and the investigation contains experimental or field work. Although these are not absolute requirements for the essay, environmental systems and societies is an experimental science and lends itself to hands-on work. While literature-based essays are suitable, those that rely exclusively on web-based sources run the risk of failing to adequately meet particular criteria.

The time spent with the candidate ranged from 0 to 30 hours which confirms that many teachers do not read the IB guidelines for the extended essays. Comments made by the supervisor on the circumstances surrounding the research and level of personal involvement of the candidates can be of considerable assistance to the examiners. Unfortunately, many supervisors provided no comments on the report on the cover sheet. The absence of comments does not diminish the extended essay, but a report giving an indication of personal involvement and determination is very helpful in setting the context.

Every year an increasing number of candidates treat the extended essay as an extended piece of internal assessment practical work. Supervisors should explain to candidates the requirements for an extended essay and caution them against simply writing yet another laboratory report.

Both candidates and supervisors should remember that although the use of animals in environmental systems investigations is welcomed, they should pay attention to the ethical issues involved in those experiments. Two candidates designed experiments where stress and pain were involved or death rates measured. In both cases, similar results could have been obtained by measuring, for example, changes in heart rate. The following is an excerpt from the IB policy regarding experiments with animals:

*“Experiments involving animals should be based on observing and measuring aspects of natural animal behaviour. Any experimentation should not result in any pain or undue stress on any animal (vertebrate or invertebrate) or compromise its health in any way. Therefore experiments that administer drugs or medicines or manipulate the environment or diet beyond that easily tolerated by the animal are unacceptable. Experiments resulting in the death of any animal are unacceptable.”*

## Candidate performance against each criterion

### **A: research question**

Candidates need guidance in the selection of the research question to avoid inappropriate, poorly focused or even trivial questions. Many students selected a topic that was far too general. Global warming and deforestation may indeed represent major current environmental issues, but are too open-ended topics for an essay at this level. Some candidates from the same school select very similar research questions. Candidates must ensure that the research question is cited early in the introduction.

### **B: introduction**

In the majority of the essays the relevance of the topic and the approach to the research question were explained in the introduction. Strong essays also included personal reasons for selecting the topic and why it was worthy of investigation. In a few cases, the introduction became excessively long and the student provided lots of information about the topic, which was not always relevant to the research question.

### **C: investigation**

The highest scoring essays reflected a well planned investigation based on the consultation of an appropriate range of sources. Unfortunately, a large majority of the essays were done using secondary data, mainly (or only) from the internet. Some only cited newspaper or magazine online articles and no further citations of scientific papers or even textbooks. These sources were seldom evaluated and very few essays attempted to discuss the reliability of the data presented. Most of the candidates could cite according to a standard model.

**D: knowledge and understanding of the topic studied**

Many candidates demonstrate good knowledge and understanding of the research topic, but in several cases the candidate showed conceptual misunderstandings. The most common ones were on the topic of global warming.

**E: reasoned argument**

Arguments were sometimes detailed, but many were superficial and made assumptions that the evidence did not support. Many essays had simple ideas presented as the pros and cons of the topic with an overall summary. Many of these ended up being narrative with no data to back up the points made. Although personal opinions are acceptable, candidates should remember to substantiate them with available evidence. Some essays, dealing with topics such as vegetarianism or hybrid cars, contained so many weighted words and so much biased propaganda that the resulting work could not be considered to be in the least bit scientific.

**F: application of analytical and evaluative skills appropriate to the subject**

These criteria were good discriminators separating the excellent essays from the more mediocre. The essays that did attempt some primary data collection often ended up with higher marks as they managed to do more analysis, evaluation and justification. It is not good enough to simply quote results without evaluating their reliability. The candidate must make it clear how the data and information being presented in the essay help to answer the research question. On the other hand, few essays carried out very sophisticated statistical treatments.

**G: use of language appropriate to the subject**

Candidates scored higher marks in this criterion. Generally candidates used appropriate terminology and communicated ideas clearly. In a few cases, candidates employed colloquial expressions and informal language. Most took a systems approach if not directly then by inference.

**H: conclusion**

Some candidates did not make a clear distinction of where the discussion of the results finished and where the conclusion started. It is recommended to have a subsection labelled "Conclusions". In many cases, candidates failed to refer to unresolved questions and new questions that had arisen as a result of the research. In a good conclusion the candidate will refer back to the research question or the hypothesis derived from this, and say to what extent the question has been answered or the hypothesis supported. Many suggestions for further investigations were too simplistic.

## **I: formal presentation**

There was a considerable variation in the way the essays were presented. The great majority of the essays submitted looked good superficially; even some weak candidates can produce a well presented essay. Word processing and the use of Microsoft Word to provide footnotes or endnotes have raised the standard of presentation. However, there were a number of common problems, where candidates needed guidance, that are discussed below (under “Recommendations for the supervision of future candidates”).

## **J: abstract**

Almost every essay included an abstract, but many candidates did not pay attention to the requirement for the three aspects of an abstract: research question, scope and conclusion. The element that students found most difficult was to describe the scope of the investigation. Some students are still writing more than 300 words and indicating at the bottom of the abstract, which confirms lack of knowledge of the requirements for this criterion.

## **K: holistic judgment**

In order to gain high marks students must clearly show a high degree of personal input and imagination. The comments provided by the supervisor are very useful when awarding marks for this criterion. However, as mentioned before many supervisors fail to provide any comments. When the investigations have been carried out at outside institutions or universities or are library based research, the supervisor’s comments are essential to evaluate the candidate’s initiative and engagement. Sadly, a few essays appear to have been submitted in the subject as a “catch-all” subject for things relating vaguely to the environmental systems and societies topic.

## **Recommendations for the supervision of future candidates**

The candidate must be supervised throughout the whole process, not just at the beginning and/or end. The supervisor must ensure that the candidate knows the requirements of the extended essay and is aware of the differences from internal assessment practical work. The amount of time many supervisors spend with the candidate appears either insufficient or excessive.

Rather than allowing the student to select a research topic from a list given by the supervisor, it is recommended that the student provides a list of topics of interest and the supervisor helps to select one of them and refine it to a manageable research topic. This way the student feels “ownership”, increasing their motivation and engagement. Supervisors should strongly encourage the candidate to undertake some practical or field work and furthermore encourage them to study issues from their school or local environment. A good research question is one that asks something worth asking and that is answerable within 40 hours/4,000 words.

The structure of the essay should be consistent with the table of contents. In some cases candidates use headings on the table of contents which do not appear in the text of the essay.

Many candidates need additional assistance when selecting the material to be included in the appendix section. Appendices often included all raw data which could have been omitted or condensed. Essays are not required to have an appendix. Important data should always be in the body of the essay. Many candidates use the appendix as a way to avoid exceeding the word limit of the essay.

Many essays presented very good illustrative material, but often diagrams and pictures are copied directly from the sources and included in the essay with no commentary or attempt to explain them in context. Students should always indicate the sources of their illustrations. In general, it is better to show pictures of the student doing the field work, than presenting unrelated images from the internet.

The use of significant figures is a common problem. When averaging results, more significant figures should not be given than those used in the individual measurements.

Supervisors also need to ensure that candidates know how to distinguish between reliable and dubious information obtained from the internet.

Supervisors should always write a report when completing the cover sheet of the essay. Additional information could help the examiner understand the personal engagement of the candidate. For example, when the number of hours spent with the student discussing the extended essay is zero (in particular), it is necessary to describe how it was possible to guarantee the authenticity of the essay in such circumstances.