

November 2015 subject reports

Environmental Systems & Societies

Overall grade boundaries

Standard level

Grade:	1	2	3	4	5	6	7
Mark range:	0 - 14	15 - 29	30 - 41	42 - 53	54 - 64	65 - 76	77 - 100

Standard level internal assessment

Component grade boundaries

Grade:	1	2	3	4	5	6	7
Mark range:	0 - 7	8 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 42

General Comments

It's hard to believe that 2015 is coming to an end. In Santiago Chile the weather has been really peculiar, even taking into account the El Niño phenomenon. It seems our old friend is misbehaving. We have had quite a bit of unseasonal rainfall, and a very cool spring, but as of this writing the weather seems to have finally turned to heat and we are being warned of record heat this summer.

The November 2015 moderation exercise included about 60 schools.

The range and suitability of the work submitted

On a positive note, the variety of practicals continues to be amazing. Teachers are incredibly creative when it comes to developing practical exercises for their candidates. If teachers are doing practicals that they have developed internally and that are providing candidates with good results year after year, please consider contributing these to the OCC which is a common resource that teachers with less experience can use to really strengthen their programs.

Candidate performance against each criterion

Planning

There continue to be issues regarding the correct identification of the independent and dependent variables among some candidates, but more worrisome is to see them awarded full marks by their teachers for such a mistake. This is not a trivial mistake because it highlights a pretty deep misunderstanding of what is being researched. For some candidates the terms “manipulated” and “responding” variable may be useful when teaching the concept. Many candidates failed to indicate really important controlled variables or variables that will be constant throughout the work and that will therefore have an equal effect on all samples.

Some teachers are expecting candidates to describe how each variable will be controlled and docking marks in Aspect 1 in this regard. However Aspect 1 requires the identification of the relevant variables. Any description of how they are to be controlled is assessed under Aspect 2. A critical aspect of this second aspect is a clear description of how a study site is to be selected. Most of the tests that are performed on samples are clearly not designed by candidates, so the candidate’s contribution to the design of the practical is designing a representative sampling effort and of course choosing what tests to run on their samples. It follows that this part of the planning effort should be quite detailed, but often candidates supply a cursory description of this and devote pages to a detailed description of methods that can be looked up in any probe manual. This point has been made in previous reports and it’s discouraging to see candidates miss marks here.

Aspect 3 of planning continues to have some issues with the number of samples/plants/quadrats etc. that candidates are including in their planning. This has been spelled out in previous reports; five repeats of each treatment are required as a minimum.

Finally, with respect to planning, a number of candidates lost marks for having methods that were too similar to the teacher’s or their classmates’ methods.

Data Collection and Processing (DCP)

The problems evident in this criterion do not vary much from year to year, however it seems that fewer candidates make these mistakes. Teachers by and large have listened to the message regarding numbers of decimal places and the use of units. There are still some candidates that fail to include a good title and these are fundamental for all tables, charts and/or graphs. “Raw Data Table” is not sufficient and will normally result in the loss of a mark if no other title is provided.

Candidates showed quite a lot of skill in calculating means, medians, diversity indexes, percent differences, etc. This is encouraging and is made easier when candidates have an appropriately sized data set. Many candidates lost marks as they failed to include a correctly worked sample calculation. One area of concern is the use of standard deviations. The actual computing is being carried out correctly for the most part, however the resulting value is often misused or what the value signifies is misrepresented. This is an area that requires direct instruction. When a candidate draws a bar chart with 5 means of some data and then a second bar chart showing the standard deviations (also as bars) for each of the means in the previous graph, clearly they

do not really understand what they are doing. Candidates are also losing marks on their graphs for not indicating what the error bars represent. A little note on the graph indicating that error bars are plus/minus one standard deviation is all that is required.

Candidates also lost marks for not providing a clear title for their graphs or neglecting to include labels on the axes. As candidates are allowed to submit a first draft and this is so easy to correct, one has to wonder if teachers are providing feedback on first drafts or if candidates are even writing a first draft. Some teachers provide candidates with a checklist or model graph at the beginning of the course so that candidates can go through a checking process and not lose marks for errors of omission on tables and graphs.

Discussion, Evaluation and Conclusions (DEC)

In this session few candidates obtained full marks in Aspect 1 of this criterion. Discussions tended to be weak and did not always successfully link the work with theory, secondary data or some broader context. This is unfortunate because one of the important parts of practical work in ESS is to provide candidates with a broader understanding of the topics they are studying, while at the same time learning how science is done. Reflecting on how their results support or refute theory or other studies is really important in terms of acquiring critical thinking skills and becoming knowledgeable consumers of scientific information. Another quite important weakness is that, after having gone to the trouble of calculating the standard deviation, very few candidates actually comment on what this means or the implications with regards to the quality of their data. If this statistic has been calculated, not mentioning it in the discussion will almost certainly prevent access to the 'Complete' level descriptor.

For Aspect 2 of DEC, some schools are using a chart or table format very effectively so that candidates included weaknesses and possible improvements. Weaker schools have entire cohorts (at least as they are represented in the sample) examining issues that should be controlled and have little place in the evaluation. For example when candidates indicate that they weren't given enough time as the sole problem with the practical they should receive a "not at all."

Conclusions continue to suffer from general statements about the gravity of the problem being studied and/or failure to refer to the results explicitly, citing data in support. Also often candidates lost marks for not supplying a brief, correct explanation for their conclusion.

Recommendations for the teaching of future candidates

When moderators write feedback, they have access to the feedback provided to the school in previous years. They are not required to write lengthy reports in the general comments. However, many of them do, especially for schools that are struggling, and this is really in the spirit of the IB. It is therefore disheartening to read the previous reports and find that many if not most of the issues raised in previous sessions, have not been addressed.

Standard level paper one

Component grade boundaries

Grade:	1	2	3	4	5	6	7
Mark range:	0 - 7	8 - 15	16 - 22	23 - 27	28 - 31	32 - 36	37 - 45

General comments

The G2 feedback received from schools comprised of an equal split between consideration of papers taken in English and Spanish; and a division of 60% IB Americas and 40% IB Asia Pacific schools.

The majority of respondents (92%) to the G2 questionnaires confirmed that the level of difficulty of Paper 1 was 'appropriate' for an SL paper, although the remaining 8% of respondents considered it to be 'too difficult'.

When compared to the November 2014 paper, 66.7% of respondents considered the November 2015 to be of a similar standard, although 33.3% believed it to be more difficult.

Most G2 respondents considered the clarity and presentation of the paper to be fair or better. The majority of respondents also agreed that questions were accessible to all candidates with learning support and irrespective of religion/belief system, gender or ethnicity.

The number of candidates for November exam session continues to be small compared to the May session. The November 2015 session had about 800 candidates, an increase by nearly 10% from November 2014. The mean for November 2015 of 22.8 was higher than the mean for November 2014 of 20.01 but similar to the mean for November 2013 of 22.71.

The areas of the programme and examination which appeared difficult for the candidates

- Clear sequence of methodology used to determine biomass.
- Ability to explain energy efficiency of a vegetarian diet.
- Attention to command terms e.g. 2d term used was 'explain' not 'describe'.
- Ability to draw survivorship curve for K-strategists and how to outline the reasons for this curve.
- Confusion between role of stratospheric ozone and GHGs in the troposphere.
- Knowledge about the formation of ozone.

The areas of the programme and examination in which candidates appeared well prepared

- Soil features.
- Ecological interactions and role of abiotic factors.
- Mutualistic and parasitic relationships.
- Future world population pyramid.
- Management strategy to reduce urban air pollution.
- Interpretation of figures.

The strengths and weaknesses of the candidates in the treatment of individual questions

1a) The majority of candidates were able to provide a sufficient answer for 2 marks.

1b) Responses to this question varied (0 to 2 marks) with also a significant number of no responses. The majority of candidates recognised that dry weight needed to be determined, although some responses did not state how this was done. Some candidates incorrectly referred to the Simpson or Lincoln index.

1c) The majority of candidates achieved some marks for this questions. Many candidates identified that a vegetarian diet involved eating food at a lower tropic level but fewer responses recognised how energy was lost along the food chain. A significant number of candidates incorrectly focused on vitamin and nutrient levels.

2ai) A large number of candidates gained both marks for this questions. Common error was mis-interpretation of the equation used to calculate Simpson Diversity Index.

2aii) Most candidates obtained some marks for this questions. Marks were often lost for answers covering only one marking point or answers being too vague e.g. death of species without suggesting the reason such as predation.

2bi) Most candidates correctly answered this question. The most popular response was 'temperature'. Common error was to name a biotic factor.

2bii) The majority of candidate answered this question well. Occasionally the candidates described testing a parameter different to the one named in 2bi).

2c) This question was generally well answered. Some responses lacked the detail required e.g. parasitic relationship is detrimental to the host and beneficial to the parasite.

2d) Responses to this question were varied. Some accounts were only descriptive and lacked the explanation required to be awarded any marks.

3ai) This question proved to be challenging for most candidates. Only a few were able to correctly draw a survivorship curve and label the axis appropriately.

3aii) Few candidates were able to correctly answer this question. Most quoted the characteristic of K species e.g. they have few offspring.

3bi) Few candidates were able to accurately answer this question.

3bii) The responses to this question varied widely. A significant number of candidates did not attempt the question and a number of responses only covered one marking point.

4) Nearly all candidates acquired some marks for this question, with a significant number obtaining 3 or 4 marks. Some responses only covered one or two marking points. Some accounts covered reasons for the change in population rather than describing the key features of the projected changes.

5ai) Marks awarded varied widely. A significant number of responses only covered one marking point. There were also a number of no responses. There was sometimes confusion between the role of stratospheric ozone with tropospheric ozone and also with the greenhouse effect.

5aii) A large number of candidates answered this question adequately. A common error was to confuse ozone depleting substances with greenhouse gases emitted from combustion of fossil fuels.

5bi) This question was generally poorly answered. Candidates appeared to have little knowledge of the precursors and conditions required for formation of tropospheric ozone. There were a significant number of no responses to this question.

5bii) This question was well answered with most candidates achieving some marks. A common mistake was to list a number of strategies without any evaluation.

5c) Responses were mixed to this question. Many answers were too vague e.g. water pollution or air pollution instead of being more specific such as acid deposition or eutrophication.

6ai) Most candidates correctly answered this question.

6aii) A large number of candidates correctly answered this question. A common mistake was errors in the calculation of percentage change

6aiii) This question was answered well by most candidates.

6b) Marks for this question varied widely, most responses achieved some marks. Common errors included not clearly stating a personal opinion and only covering one or two marking points.

Recommendations and guidance for the teaching of future candidates

- Ensure candidates understand the meaning of the different command terms used.
- Practice relevant mathematical calculations.
- Encourage candidates to attempt all questions and not leave blanks (i.e. no responses).
- Ensure candidates have a clear knowledge and understanding of:

- Steps involved in determining biomass
- Energy efficiency of a vegetarian diet vs meat based diet
- K-strategist and r-strategist survivorship curve
- Role of stratospheric ozone and ODS
- Factors contributing to the formation of tropospheric ozone
- Differences between stratospheric and tropospheric ozone

Standard level paper two

Component grade boundaries

Grade:	1	2	3	4	5	6	7
Mark range:	0 - 8	9 - 16	17 - 22	23 - 30	31 - 39	40 - 47	48 - 65

General comments

12 schools completed the online G2 form. 6 in English and 6 in Spanish. This is similar to last year but a decline from previous years. All the schools found the paper had an appropriate level of difficulty. 10 schools found the exam of a similar standard to last year and 2 a little more difficult. All found the clarity of wording and the presentation satisfactory or good.

There were two comments on the G2 forms, one in English and one in Spanish. One indicated a specific question giving too much information guidance and the other queried having the resource booklet in colour. The lack of comments, or G2 responses, can be viewed in a positive light and the assumption is made that the teachers and candidates found the exam paper accessible and the questions asked to be suitable.

One response indicated all the special education needs as “strongly disagree” but if no comments are added to indicate the how the questions limited accessibility, this is difficult to follow up. We hope to provide the Resource Booklet in colour from the May 2017 examination session onwards.

In the essay section questions 2 and 3 were the most popular, closely followed by question 4, and question 5 was the least popular.

The standardizing team considered how the candidates answered questions as the final markscheme was prepared. When candidates approached questions in a different way from the original exam writers expected interpretation then the markscheme is reviewed. Generally both the original interpretation and the post-exam interpretation are included, as long as the concepts are correct.

The areas of the programme and examination which appeared difficult for the candidates

In Section A some candidates gave one sentence answers for two or three mark questions, usually meaning only one mark was awarded.

The questions asking for explanations and reasons for pollution proved to be harder for the candidates. Some questions were answered round the wrong way, this could be because the question was not read carefully enough.

Candidates found it challenging to have to use the concepts in relation to the case study rather than to just define/identify the terms. This led to long winded answers in the boxes before the actual question was attempted.

In Section B some candidates are still trying to incorporate the three parts of the essay into a continuous prose. This can mean they focus mainly on one part only, not always the part with the most marks available. Very few candidates gave no response to parts of questions.

In essays many candidates often repeat points and use weak, vague examples in an attempt to support the arguments. Often the example used wandered off from the question asked. Here the candidate was just writing all the information they knew about the example or topic without referring back to the question. Application of concepts and examples to a specific question indicates the holistic aspects of the course are lacking.

Candidates found the command term “distinguish” difficult to apply in the part (a) of the questions.

Question 2b which combined systems with global climate proved difficult for most candidates to gain more than a few marks on. Question 5b also proved problematic for candidates as they often struggled to make the connections between the three concepts.

Evaluate and discuss are the command terms that are most often misunderstood. Only strong candidates gave the balancing/arguments and a conclusion. Assessment objective 4 stresses the need to make reasoned and balanced judgments using appropriate economic, historical, cultural, socio-political and scientific sources. Only the very best candidates were able to demonstrate this balance. The ability to develop coherent responses with conclusions underpinned by balanced analyses will be more important with the introduction of markbands from the May 2017 examination session onwards.

The areas of the programme and examination in which candidates appeared well prepared

Most candidates completed the paper answering all the parts of section A and two essays in section B. The candidates seemed to generally have enough time to complete the paper. The resource booklet did not seem to cause problems with accessing information. They were able to extract the required details from the resource booklet when asked in specific questions. Not many candidates required extra paper, indicating that the space provided was adequate.

The handwriting was generally clear this session, most candidates used a dark enough pen (it should be blue or black) and so the computer image was clear.

The essays were asking for the use of case studies and application of environmental value systems. Generally the candidates had solid case studies and knew and could apply the value systems.

The concepts of global warming, human population & development policies were seen to be grasped by the candidates.

The use of examples was more prevalent this session, even when the question did not specially ask for an example. There is still a need to for more detail to be given in the examples used.

The strengths and weaknesses of the candidates in the treatment of individual questions

Section A

Question 1

a) Only a very small minority gave an incorrect answer here. Most candidates gave a detailed enough answer including interbreeding and fertile offspring.

b) The majority of candidates gained marks for two roles in the ecosystem. However a significant number gave one way and then just repeated the previous points made. Only a few candidates missed a mark here.

c) The candidates generally had no problems with identifying the two features, most mentioning the wingspan and feather colouration.

d) There were many ways to answer this question and most candidates gave a feature and could link this to extinction. A significant minority only mentioned how the condors become extinct and did not mention a specific feature of the bird.

e) Most candidates had no problem answering this question. A few could only vaguely mention a method or gave the Simpson's diversity index.

f) This question was generally answered correctly, a few gave only one justification for being a K strategist.

gi) This question really challenged the candidates. Many just re-phrased the question rather than providing an answer. More than just a one word answer was required, the command term was "suggest".

gii) Many candidates found this difficult to state the correct term.

h) The candidates found this question straightforward as they could use the information directly from the resource booklet to answer. However they did not always manage to use the correct strategy for the process of pollution.

i) Again the resource booklet provided a number of direct answers for this question. The candidates nearly all managed to gain the marks for this question.

j) Most candidates gained both marks for this question. Stating two clear arguments for the conservation of condors proved hard for weaker candidates

k) This question was generally answered correctly. A few candidates gave only one word as the answer, or confused the answers.

l) Only the stronger candidates gave a complete evaluation, most candidates focused on the strengths.

Section B

Question 2

a) Generally the candidates showed that the concepts of renewable and replenishable have been understood. Most could define them and give examples, and many candidates did indicate a distinguishing feature. Some candidates did confuse the two types of natural capital.

b) Most candidates could define or outline the basics of a system. Linking this to the global climate was difficult for most candidates. Many could identify the energy inputs and outputs, but the matter movements was only clearly explained by the stronger candidates. The use of feedback loops in the system was popular with many candidates.

c) The candidates struggled with the discussion aspect of the question. Most candidates compared ecocentric and technocentric philosophies, which led to a discussion by default. The candidates focused on the philosophy strategies leading to a reduction in global warming, but very few candidates linked this to a specific pollution management strategy. A conclusion was often very vague or missing from the answers.

Question 3

a) The candidates could generally define carrying capacity and ecological footprint correctly. A few had them round the wrong way. They did find distinguishing between the two concepts difficult, often the answers were very vague.

b) The candidates seem to be aware of the energy sources used in case studies of specific countries. They could state reasons for the choices fairly clearly, though often they only had one reason and they repeated the same point in a number of sentences.

c) Naming national development policies was not a problem for the majority of candidates, however the international policies were less clear. The stronger candidates gave detailed explanations of how these policies lead to reduced population growth over time. Weaker candidates often mentioned increased growth reasons, so going off the topic of the question

asked. Many candidates gave long detailed answers about one policy, usually the one child policy in China, which ultimately only gained a few points. Candidates should read the question carefully to ensure they remain focused on the question asked.

Question 4

a) Most candidates gave a reasonable definition of transfer and transformation with an appropriate water example. Only the stronger candidates gave a clear distinguishing statement which meant they could not obtain full marks for the question.

b) The candidates approached this question from the biome and they mostly mentioned the climate factors as general conditions for the named biome. So the distribution aspect of the question was often vague. The link to productivity was generally made but lacked details. A few candidates gave more than one biome, in these cases the biome gaining the most marks was considered.

c) The naming of a freshwater case study was either very well done or extremely vague. The answers showed that the candidates had not really considered this case study from different philosophical viewpoints, so the focus was often on one approach with a weaker comparison. The focus was often not the decision making process but the general approach the environmental philosophy towards managing water resources. The conclusion mark was very difficult for most candidates to obtain.

Question 5

a) Candidates could define succession and zonation correctly and most gave a reasonable example of each. Many candidates did not attempt to distinguish between the two concepts.

b) The candidates found the definitions of each concept fairly easy to write. However explaining the relationship proved to be much harder, many answers interchanged the concepts in repeated sentences without clearly demonstrating an explanation. Diversity and succession seemed to be easier for more candidate to explain, stability caused more confusion.

c) The concept of a social system seemed to confuse candidates, but most managed to mention some social systems such as LEDC and MEDC. The markscheme allowed for a wide range of interpretations of the term "social system". Many candidates wrote about contrasting food production systems without really mentioning the social systems involved. This question was poorly answered by many of the candidates.

Recommendations and guidance for the teaching of future candidates

The following is a summary of the advice for teaching future candidates:

- Review the meanings of command terms so candidates know what is required in each question. Especially for Assessment Objective 3 command terms.
- Encourage candidates to make annotated diagrams large and clear if they are using them to support text in their responses.
- Make sure candidates pay attention to the "point value" for each question to gauge how

many different and distinct statements they need to address to earn full marks. Encourage candidates to give clear, diverse and discreet marking points, rather than a single vague, limited, and repetitive discourse.

- In Section B, instruct candidates to break up their answers into the relevant sub sections to make it easier for the examiner to identify which part of the question they are answering. The answers are not expected to be one long essay.
- Ensure sufficient time is dedicated to the teaching of the systems and values elements of the course. To enable the holistic nature of the course to be recognized and used in the answers.
- Reinforce the importance of learning key definitions and terminology.
- Clarify how the expression of ideas (EoI) marks are allocated and use them in your own marking so candidates get used to developing their answers, including examples and structuring their ideas.
- Candidates should be encouraged to write within the space provided within the exam paper in Section A, and if they go outside of it to make it clear to the examiner that they have done this. Examiners are also under time pressure to get their scripts marked and if there is no indication the candidate has gone outside of the box, work worth marks could be missed.
- Please encourage candidates to print specific examples as these are often hard to interpret when the handwriting is bad.
- Detailed examples/case studies are needed for all areas of the syllabus. Local ecosystems should be used and then the inter-relationships can be explicitly noted.