Diploma Programme
Programme du diplôme
Programa del Diploma

Environmental systems and societies
Standard level
Paper 2

Monday 6 November 2017 (morning)

2 hours

Candidate session number

Instructions to candidates

- Write your session number in the boxes above.
- Do not open this examination paper until instructed to do so.
- Section A: answer all questions.
- Section B: answer two questions.
- Answers must be written within the answer boxes provided.
- A calculator is required for this paper.
- The maximum mark for this examination paper is **[65 marks]**.

20 pages

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Section A

Answer **all** questions. Answers must be written within the answer boxes provided.

1.   (a)   (i)   Define the term *carrying capacity*.   [1]

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(ii)   Identify **three** reasons why carrying capacity can be difficult to estimate.   [3]

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Figure 1: Table showing population data for three countries

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$$\text{Doubling time (DT)} = \frac{70}{\text{NIR}}$$

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(Question 1 continued)

(b) (i) With reference to **Figure 1** calculate the DT for India (X). [1]

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(ii) With reference to **Figure 1** calculate the NIR for Japan (Y). [1]

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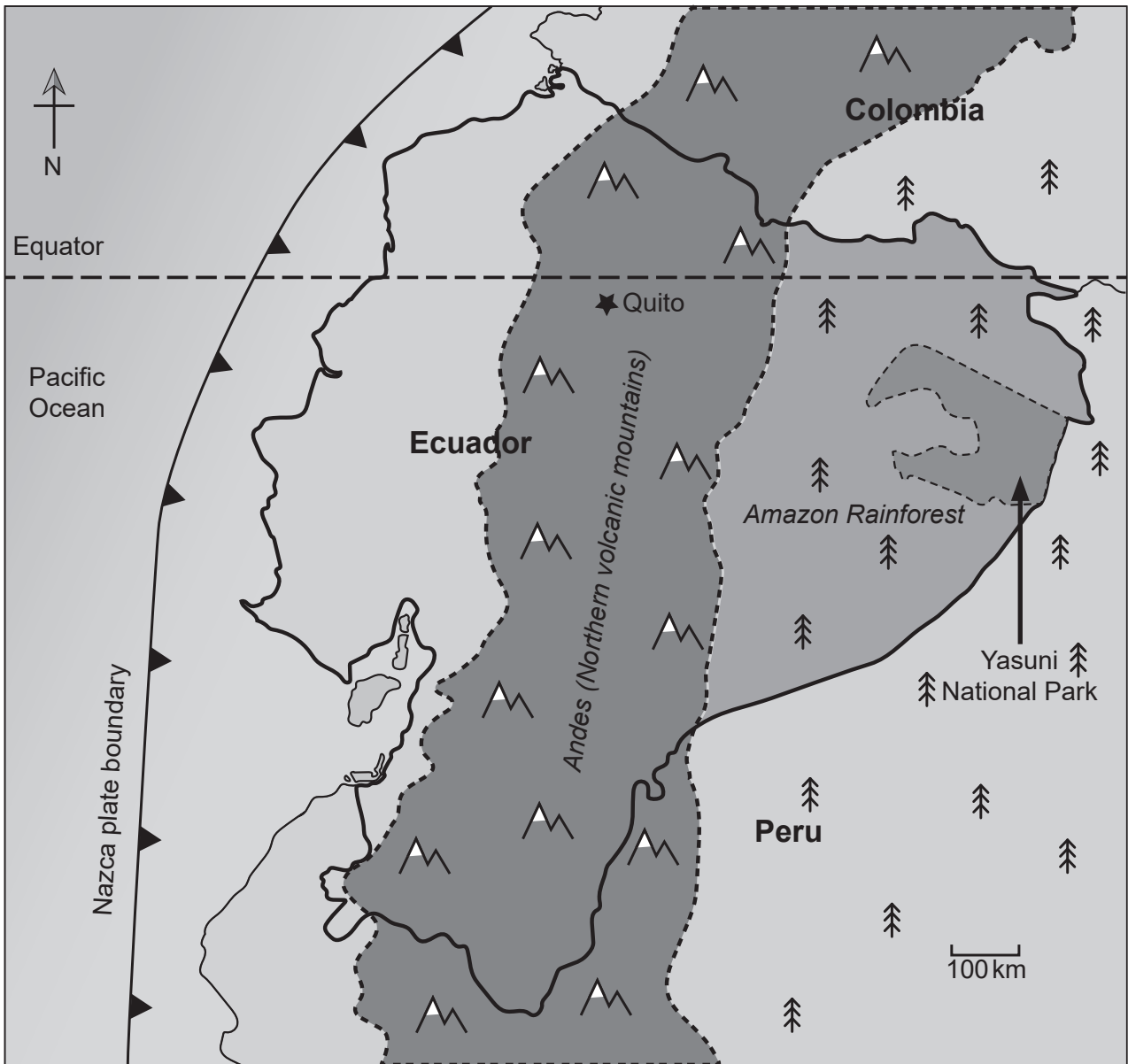..

(c) Identify **two** reasons why Uruguay has the biggest ecological footprint. [2]

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Figure 2: Map to show the location of Yasuni National Park in Ecuador, a globally significant high biodiversity area

[Source: © International Baccalaureate Organization 2017]

2. (a) (i) Define *biodiversity*. [1]

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(Question 2 continued)

(ii) With reference to **Figure 2** identify **three** factors that could explain the high biodiversity in Ecuador. [3]

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Figure 3: Table to show the species richness of Yasuni National Park

Group	Number of species	Unit area (km^2)
Amphibians	139	6.5
Trees	655	0.1

[Source: Margot S. Bass, Matt Finer, Clinton N. Jenkins, Holger Kreft, Diego F. Cisneros-Heredia, Shawn F. McCracken, Nigel C. A. Pitman, Peter H. English, Kelly Swing, Gorky Villa, Anthony Di Fiore, Christian C. Voigt and Thomas H. Kunz, 'Global Conservation Significance of Ecuador's Yasuní National Park.' *PLoS One*, January 19, 2010. https://doi.org/10.1371/journal.pone.0008767]

(b) Describe a method that may have been used for collecting the tree data in **Figure 3**. [2]

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(Question 2 continued)

Figure 4: Table to show data collected from two phototrap surveys of ocelots
(Leopardus pardalis) **in a forested area of Yasuni National Park. Ocelots are predatory**
wild cats with unique coat markings

[Source: João Carlos Medau / https://en.wikipedia.org/wiki/Ocelot#/media/File:Ocelot_(Jaguatirica)_Zoo_Itatiba.jpg]

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(c)   With reference to **Figure 4** estimate the population size of ocelots in Yasuni National
Park for Site B.   [1]

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(Question 2 continued)

(d) Outline **two** reasons for the differences in population size and density of ocelots at Site A and B of Yasuni National Park as shown in **Figure 4**. [4]

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3.   **Figure 5: A layer of smog covering the Chilean city of Santiago**

[Source: CC BY-SA 3.0, https://commons.wikimedia.org/w/index.php?curid=428144]

(a)   (i)   Identify **one** human factor that contributes to photochemical smog.   [1]

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(ii)   Identify **one** natural factor that contributes to photochemical smog.   [1]

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(Question 3 continued)

(b) Explain why the formation of photochemical smog may have harmful effects on the environment of cities such as Santiago (Chile). [4]

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Section B

Answer **two** questions. Answers must be written within the answer boxes provided.

4. (a) Describe the role of primary producers in ecosystems.   [4]

   (b) Explain the potential impact of ocean acidification on environmental systems and
        societies.   [7]

   (c) To what extent do anthropocentric value systems dominate the international efforts to
        address climate change?   [9]

5. (a) Distinguish between the concept of a "charismatic" (flagship) species and a keystone
        species using named examples.   [4]

   (b) Explain the role of **two** historical influences in shaping the development of the
        environmental movement.   [7]

   (c) Discuss the implications of environmental value systems in the protection of tropical
        biomes.   [9]

6. (a) Outline the reasons why natural capital has a dynamic nature.   [4]

   (b) Explain how the inequitable distribution of natural resources can lead to conflict.   [7]

   (c) The management of a resource can impact the production of solid domestic waste.

        To what extent have the three levels of the pollution management model been
        successfully applied to the management of solid domestic waste?   [9]

7. (a) Outline how soil can be viewed as an ecosystem.   [4]

   (b) Compare and contrast the impact of humans on the carbon and nitrogen cycles.   [7]

   (c) Discuss the role of humans in the destabilization of ecological systems.   [9]