

No part of this product may be reproduced in any form or by any electronic or mechanical means, including information storage and retrieval systems, without written permission from the IB.

Additionally, the license tied with this product prohibits commercial use of any selected files or extracts from this product. Use by third parties, including but not limited to publishers, private teachers, tutoring or study services, preparatory schools, vendors operating curriculum mapping services or teacher resource digital platforms and app developers, is not permitted and is subject to the IB's prior written consent via a license. More information on how to request a license can be obtained from <http://www.ibo.org/contact-the-ib/media-inquiries/for-publishers/guidance-for-third-party-publishers-and-providers/how-to-apply-for-a-license>.

Aucune partie de ce produit ne peut être reproduite sous quelque forme ni par quelque moyen que ce soit, électronique ou mécanique, y compris des systèmes de stockage et de récupération d'informations, sans l'autorisation écrite de l'IB.

De plus, la licence associée à ce produit interdit toute utilisation commerciale de tout fichier ou extrait sélectionné dans ce produit. L'utilisation par des tiers, y compris, sans toutefois s'y limiter, des éditeurs, des professeurs particuliers, des services de tutorat ou d'aide aux études, des établissements de préparation à l'enseignement supérieur, des fournisseurs de services de planification des programmes d'études, des gestionnaires de plateformes pédagogiques en ligne, et des développeurs d'applications, n'est pas autorisée et est soumise au consentement écrit préalable de l'IB par l'intermédiaire d'une licence. Pour plus d'informations sur la procédure à suivre pour demander une licence, rendez-vous à l'adresse <http://www.ibo.org/fr/contact-the-ib/media-inquiries/for-publishers/guidance-for-third-party-publishers-and-providers/how-to-apply-for-a-license>.

No se podrá reproducir ninguna parte de este producto de ninguna forma ni por ningún medio electrónico o mecánico, incluidos los sistemas de almacenamiento y recuperación de información, sin que medie la autorización escrita del IB.

Además, la licencia vinculada a este producto prohíbe el uso con fines comerciales de todo archivo o fragmento seleccionado de este producto. El uso por parte de terceros —lo que incluye, a título enunciativo, editoriales, profesores particulares, servicios de apoyo académico o ayuda para el estudio, colegios preparatorios, desarrolladores de aplicaciones y entidades que presten servicios de planificación curricular u ofrezcan recursos para docentes mediante plataformas digitales— no está permitido y estará sujeto al otorgamiento previo de una licencia escrita por parte del IB. En este enlace encontrará más información sobre cómo solicitar una licencia: <http://www.ibo.org/es/contact-the-ib/media-inquiries/for-publishers/guidance-for-third-party-publishers-and-providers/how-to-apply-for-a-license>.

**Environmental systems and societies**  
**Standard level**  
**Paper 2**

Monday 11 November 2019 (morning)

Candidate session number

2 hours

--	--	--	--	--	--	--	--	--	--

**Instructions to candidates**

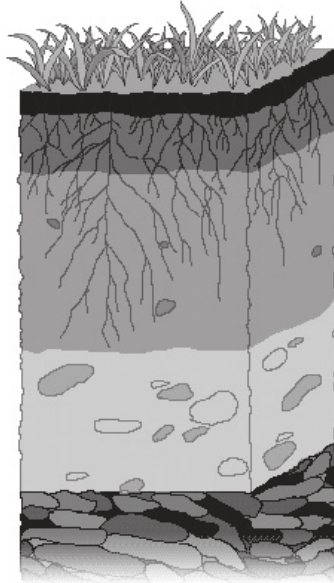
- Write your session number in the boxes above.
- Do not open this examination paper until instructed to do so.
- Section A: answer all questions.
- Section B: answer two questions.
- Answers must be written within the answer boxes provided.
- A calculator is required for this paper.
- The maximum mark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



### Section A

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

**Figure 1: A typical soil profile**



[Source: adapted from WilsonBiggs/Hridith Sudev Nambiar/Wikimedia. File licensed under CC BY-SA 4.0; <https://creativecommons.org/licenses/by-sa/4.0/>]

1. (a) (i) State **one** transfer of matter occurring within the soil profile. [1]

.....  
.....

(ii) State **one** transformation process occurring within the soil profile. [1]

.....  
.....

(iii) Identify **one** example of an output to the atmosphere from the soil system. [1]

.....  
.....

(This question continues on the following page)



24EP02

(Question 1 continued)

(b) Describe **two** characteristics of soil with high primary productivity. [2]

.....

.....

.....

.....

(c) Outline **two** conservation methods that could be used to reduce soil erosion. [2]

.....

.....

.....

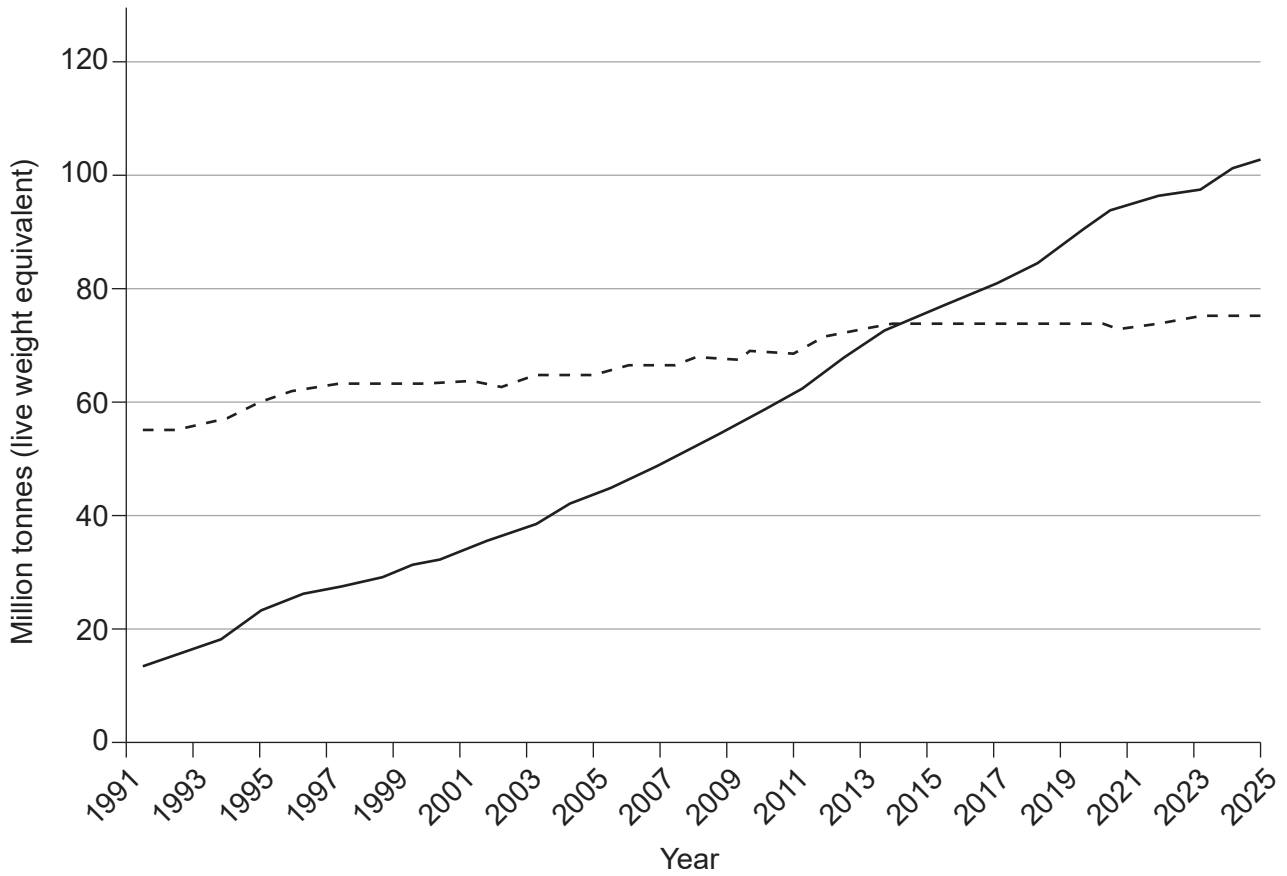
.....



24EP03

Turn over

**Figure 2: Global capture fisheries and aquaculture production from 1991 and projected to 2025**



**Key:**  
 - - - - Capture fisheries for human consumption  
 ———— Aquaculture for human consumption

[Source: Food and Agriculture Organization of the United Nations, 2016, FAO, *The State of World Fisheries and Aquaculture. Contributing to food security and nutrition for all*, <http://www.fao.org/3/a-i5555e.pdf>. Reproduced with permission.]

2. (a) Using **Figure 2**, identify **one** reason for the trend shown in the curve for:

(i) aquaculture.

[1]

.....

.....

(This question continues on the following page)



24EP04

**(Question 2 continued)**

(ii) capture fisheries.

[1]

.....  
.....

(b) Outline **two** negative environmental impacts of aquaculture.

[2]

.....  
.....  
.....  
.....

(c) Describe **two** strategies for the management of sustainable capture fisheries.

[2]

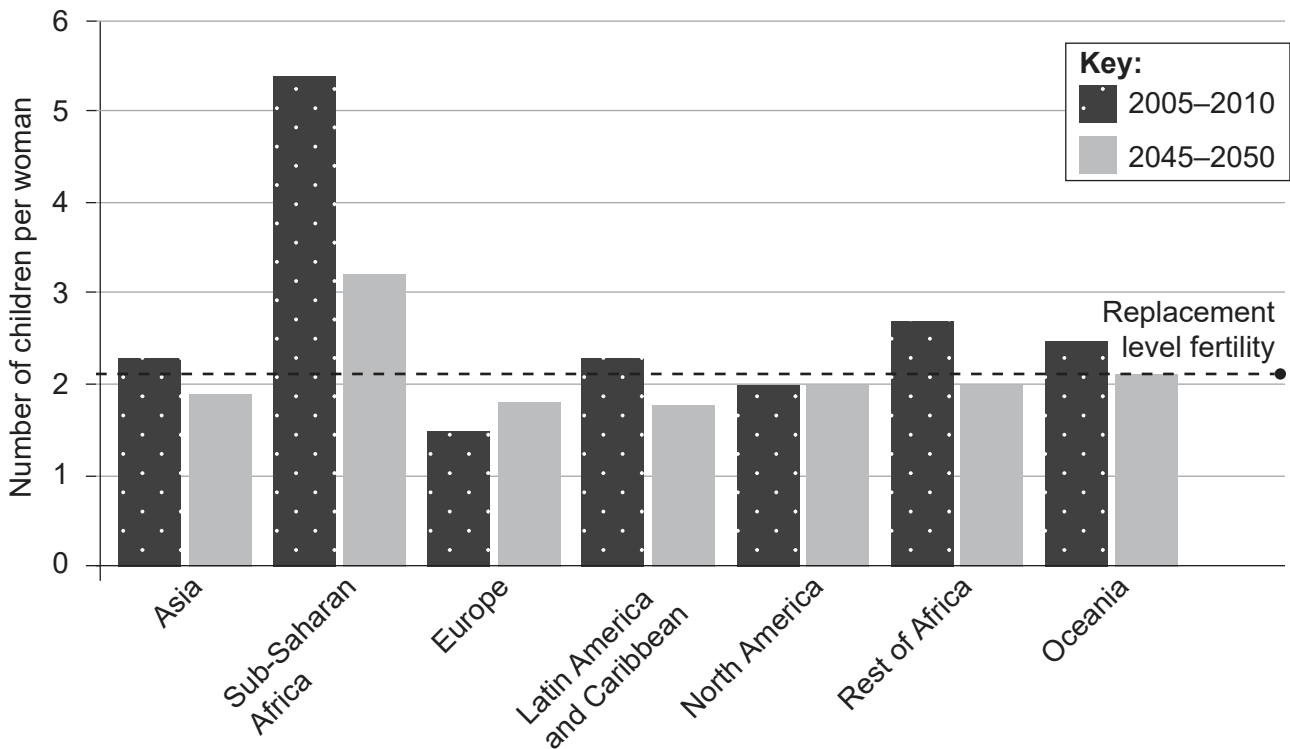
.....  
.....  
.....  
.....



24EP05

Turn over

Figure 3: Current and projected total fertility rates by region



[Source: adapted from World Resources Institute, <https://www.wri.org/blog/2013/12/global-food-challenge-explained-18-graphics>. File licensed under CC BY 4.0 (<https://creativecommons.org/licenses/by/4.0/>)]

3. (a) Using **Figure 3** identify the region with the highest fertility rate in the period 2005–2010. [1]

.....

.....

(b) Outline **two** possible reasons for the projected change in total fertility rate in Sub-Saharan Africa in the period 2045–2050. [2]

.....

.....

.....

.....

(This question continues on the following page)



24EP06

**(Question 3 continued)**

- (c) Identify **two** reasons for the projected increase in total fertility rate in Europe by the period 2045–2050.

[2]

.....

.....

.....

.....

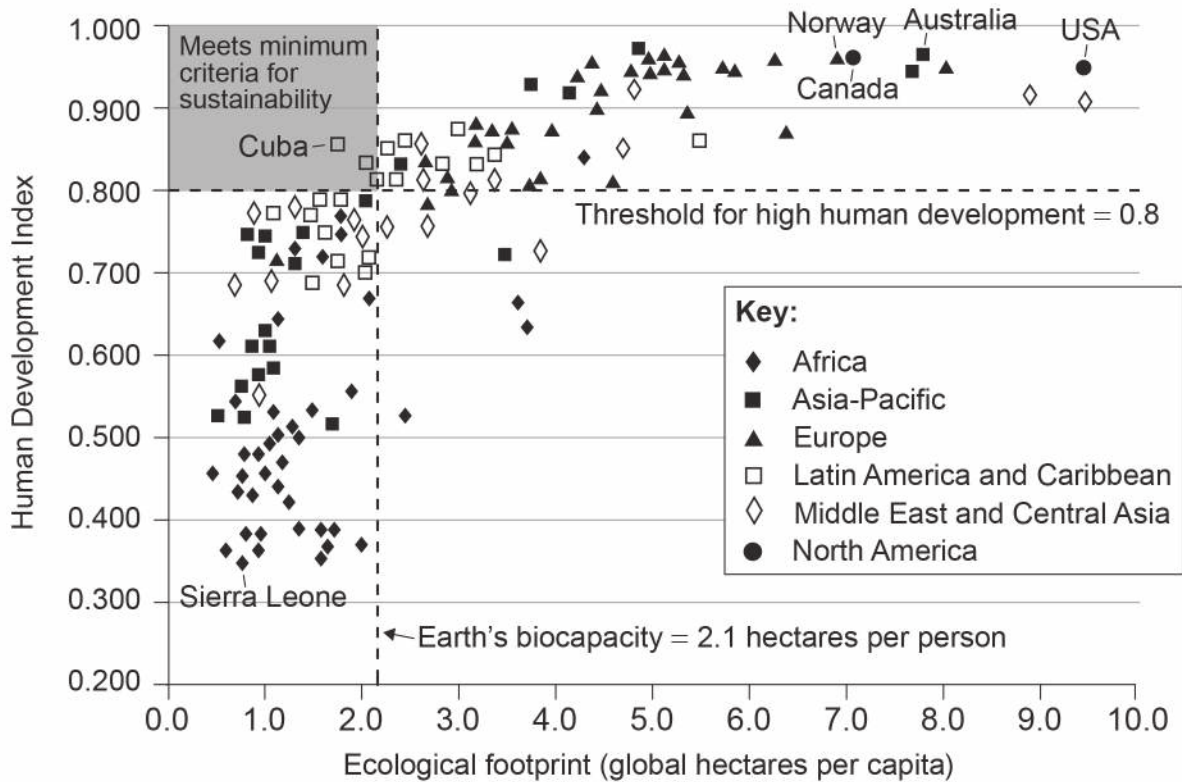


24EP07

Turn over



Figure 4: A measure of the sustainability of individual countries from a comparison of their ecological footprint and their standard of living



[Source: adapted from Travelplanner/Wikimedia. File licensed under CC BY-SA 3.0  
<https://creativecommons.org/licenses/by-sa/3.0/deed.en>. Data sourced from Global Footprint Network 2008 report (2005 data) and UN Human Development Index 2007/08]

The UN Human Development Index is a measure of the standard of living based on literacy, GDP per capita and life expectancy.

4. (a) Using **Figure 4**, identify the country that is above the threshold for high human development and below the Earth’s biocapacity. [1]

.....

.....

- (b) Outline the relationship between carrying capacity and ecological footprint. [2]

.....

.....

.....

.....

(This question continues on the following page)



24EP08

**(Question 4 continued)**

- (c) To meet the minimum criteria for sustainability, a country needs to raise its human welfare above the threshold of high human development and have an ecological footprint below the Earth's biocapacity.

Evaluate **two** strategies a country can implement to achieve the minimum criteria for sustainability.

[4]

.....

.....

.....

.....

.....

.....

.....

.....



24EP09

Turn over

### Section B

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

5. (a) Outline, using examples, the differences between primary and secondary pollution. [4]  
(b) Explain the causes and effects of acid deposition on natural ecosystems. [7]  
(c) To what extent is pollution impacting human food production systems? [9]
6. (a) Outline the factors that contribute to total biodiversity of an ecosystem. [4]  
(b) Explain how ecological techniques can be used to study the effects of human activities on the biodiversity of a named ecosystem. [7]  
(c) To what extent are strategies to promote the conservation of biodiversity successful? [9]
7. (a) Outline how energy drives the hydrological cycle. [4]  
(b) Explain, with the use of a system diagram, how human activities affect flows in the global water cycle. [7]  
(c) To what extent do the approaches and strategies of different environmental value systems improve access to fresh water? [9]
8. (a) Outline how the concept of sustainability can be applied to managing natural capital. [4]  
(b) Explain how environmental indicators are used to assess sustainability. [7]  
(c) To what extent does sustainability play a role in making decisions about energy and climate change policies at national and international levels? [9]



A large rectangular area containing horizontal dotted lines for writing.



24EP11

Turn over

A large rectangular area containing horizontal dotted lines for writing.



24EP12

A large rectangular area containing horizontal dotted lines for writing.



24EP13

Turn over

A large rectangular area containing horizontal dotted lines for writing.



24EP14

A large rectangular area containing horizontal dotted lines for writing.



24EP15

Turn over



A large rectangular area containing horizontal dotted lines, intended for writing or drawing.



24EP16

A large rectangular area containing horizontal dotted lines for writing.



24EP17

Turn over

A large rectangular area containing horizontal dotted lines, intended for writing or drawing.



24EP18

A large rectangular area containing horizontal dotted lines for writing.



24EP19

Turn over



A large rectangular area containing horizontal dotted lines for writing.



24EP21

Turn over

A large rectangular area containing horizontal dotted lines for writing.



24EP22

A large rectangular area containing horizontal dotted lines for writing.



24EP23

Turn over



A large rectangular area containing 28 horizontal dotted lines, intended for writing or drawing.



24EP24