Tutorial Letter 202/2/2018

Our Living Earth

GGH1503

Semester 2

Department of Geography

IMPORTANT INFORMATION

This tutorial letter contains important information about your module.

BARCODE

CONTENTS

Page

Dear Student

1 EXAMINATION INFORMATION

This tutorial letter contains information on the examination paper for module GGH1503 to be written during the October/November 2018 session.

Firstly, some information on the structure of the examination paper is provided, including the types of questions you can expect. This is followed by a few guidelines on how to answer the examination paper, how to prepare for the examination and what aspects to emphasise. The last part of the tutorial letter consists of an example of an examination paper for this module.

The example examination paper has exactly the same structure as the paper you are going to write, and consists of the same types of questions.

The tutorial letter concludes with feedback on Assignment 02.

Kind regards

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2 STRUCTURE OF THE EXAMINATION

The examination paper consists of two sections and is structured as follows:

- Section A counts 50 marks and consists of 50 multiple-choice questions – five for study units 1 and 2 and four each for the remaining ten study units covered in the module.
- Section B counts 50 marks and consists of six questions, of which you have to answer any five. The questions count 10 marks each and written answers are required.

Note that this **structure** and **mark allocation** are exactly the same as those of the examination paper that is included as an example in this tutorial letter.

3 GUIDELINES FOR ANSWERING THE EXAMINATION

Study unit 1 – Environmental problems and their causes, and sustainability

Section A: You have to answer 50 questions. Therefore, you will have to work fast and should not spend too much time on any individual question. If you do not know the answer to a question, move on to the next one. Mark the questions you cannot do and, if you have time at the end, you can try again to do these questions. Although there are many questions, they have been formulated in a straightforward way and do not take long to read.

Section B: Note that six questions are given in this section, but you have to answer only five of them. For instance, you have to decide which one of the questions you do **not** want to answer.

Each of these questions counts 10 marks, which means that none of your answers should exceed 250 words (approximately one written A4 page). At least one of the questions in this section will be subdivided into two shorter questions.

4 GUIDELINES FOR EXAMINATION PREPARATION

Concerning the examination paper as a whole, you will definitely benefit from focusing on the following broad themes during your preparation:

- the role of people in the current environmental dilemma
- the application of scientific laws and facts to understand environmental issues
- sustainability in view of the environmental impact of humans (individually and collectively)

Section A: Since at least four multiple-choice questions are set on each study unit in the study guide, you cannot really leave anything out. These questions are also set in such a way that they cover each of the study units in totality (i.e. they do not concentrate on specific parts of a study unit). Using the **Self-assessment** option on myUnisa will greatly aid you in your preparation for the multiple-choice questions for the examination.

Section B: Clearly, not all the study units can be covered by only six questions. To help you a bit, I would like to refer you back to Tutorial Letter 101 of this module, in which I stressed the importance of the learning outcomes that are listed at the beginning of each study unit. The learning outcomes are extremely important – they are the most important guidance that is supplied in the study guide. If you can do everything that is expected in the learning outcomes, you will be able to answer any question in the examination.

5 EXAMPLE OF THE EXAMINATION PAPER

GGH1503
Our Living Earth (12345)
May/June & Oct/Nov example paper

Time allocation: 2 hours 100 marks
Examiners **First:** Mr XYZ **Second:** Ms ABC

This examination paper consists of XYZ pages plus instructions for the use of a mark-reading sheet.

This examination paper remains the property of the University of South Africa and may not be removed from the examination room.

IMPORTANT

A After answering this examination paper, hand in the following:
   - your examination book with your answers to section B
   - one mark-reading sheet for section A; place the mark-reading sheet in the front of your examination book

B Make sure that your student number and all the other required information are written on your examination book and the mark-reading sheet. Note that the **unique number** of this examination paper (12345) has to be written and marked on the mark-reading sheet (the unique number appears in brackets after the module code in the top section of this page). Wherever the module code is required, write GGH1503.

C Allocation of marks
   - Section 1: 50 marks – 50 multiple-choice questions
   - Section 2: 50 marks – Answer **any five** of the six 10-mark questions

D It is recommended that you use the available time as follows:
- Section A: Not more than 60 minutes – here it is of extreme importance not to spend too much time on any of the questions
- Section B: 60 minutes

E Read the instructions at the beginning of each section and follow them carefully.
F All the best!

Section A

INSTRUCTIONS

Answer **all** the questions.

Mark your answers with an HB pencil on the mark-reading sheet provided to you.

Remember to write your student number and the unique number of the examination paper on the mark-reading sheet.

QUESTIONS

Study unit 1 – Environmental problems, their causes, and sustainability

1 An environmentally sustainable society ... .

(a) manages its economy and population size without doing irreparable environmental harm
(b) satisfies the needs of its people by harvesting without depleting the earth's capital
(c) protects the prospects of future generations of humans and other species
(d) meets the needs of its people without jeopardising the needs of future generations

The correct alternative/combination of alternatives is
(1) only (a) and (c)
(2) only (b) and (d)
(3) only (c)
(4) only (d)
(5) (a), (b), (c) and (d)

2 A resource that is too expensive to extract is said to be ... .

(1) perpetual
(2) economically depleted
(3) ecologically depleted
(4) environmentally depleted
(5) limited

3 Which one of the following corollaries would **not** result from an anthropocentric worldview?

(1) Animals are for shooting.
(2) People increasing their wants without limit results in loss of biodiversity.
(3) Good earth stewards preserve ecological integrity.
(4) The world is for exploiting.
(5) Pollution is not an issue.

4 A major stimulus for the Industrial Revolution was … .

(1) the bubonic plague
(2) the European Wars
(3) a shortage of wood
(4) poverty
(5) famine

5 Which one of the following alternatives is an example of recycling?

(1) collecting and remelting aluminium beer cans
(2) cleaning and refilling soft-drink bottles
(3) selling used clothing at a garage sale
(4) saving leftovers in a peanut butter jar
(5) using household water to water the garden

Study unit 2 – Science, matter, energy and systems

6 An example of environmental degradation setting in after a long time delay would be ... .

(1) clear-cutting a forest
(2) building new four-lane highways
(3) depleting the ozone layer
(4) fish killed as a result of oil spills

7 Which one of the following alternatives is an example of low-quality energy?

(1) electricity
(2) heat in the ocean
(3) nuclei of uranium-235
(4) coal
(5) food

8 Which one of the following suggestions is the **most** logical way to cope with the problem of limitations imposed by the basic scientific laws governing energy and matter?

(1) Use and waste less energy and matter.
(2) Shift to non-polluting nuclear fusion power.
(3) Increase the output of low-quality heat.
(4) Increase the input of high-quality energy.

9 In any heat-to-work conversion, the quality of the energy available after the work has been performed will always be … the initial energy quality.

(1) equal to
(2) higher than
(3) equal to or higher than
(4) lower than
(5) slightly higher than

10 Which one of the following statements about a matter-recycling society is **false**?

(1) The goal of a matter-recycling society is to allow economic growth to continue without depleting matter resources.
(2) One limitation of a matter-recycling society is dependence on high-quality energy to recycle materials.
(3) A matter-recycling society is limited by the environment's capacity to absorb and disperse waste heat and to dilute and degrade waste matter.
(4) A matter-recycling society is independent of high-quality matter, because materials can continue to be recycled indefinitely.

Study unit 3 – Ecosystems: what are they and how do they work?

11 Most of the energy input in a food chain is ... .

(1) in the form of heat
(2) converted to biomass
(3) recycled as it reaches the chain's end
(4) degraded to low-quality heat
(5) converted to carbon dioxide

12 Humans remove nitrogen from the soil by all of the following processes **except** ... .

(1) leaching water-soluble nitrate ions from soil through irrigation
(2) harvesting nitrogen-rich crops
(3) applying organic fertilizers to agricultural land
(4) mining nitrogen-rich mineral deposits

13 All of the following are abiotic factors **except** ... .

(1) light
(2) temperature
(3) pH
(4) bacteria
(5) water

14 The **most** important factor in determining which biome is found in a particular area is ... .

(1) soil type
(2) topography
(3) magnetic fields
(4) climate
(5) longitude

Study unit 4 – Biodiversity and evolution

15 When natural selection results in a shift towards one end of a normal range of traits, an evolutionary biologist would credit ... .

(1) continuous natural selection
(2) discontinuous natural selection
(3) disruptive natural selection
(4) directional natural selection
(5) co-evolution

16 Biologists estimate that more than ... of the species that have ever lived are now extinct.

(1) 59%
(2) 69%
(3) 79%
(4) 89%
(5) 99%

17 Geographic isolation as a factor contributing to speciation may be the result of ... .

(1) volcanic eruptions
(2) earthquakes
(3) mountain ranges
(4) rivers

The correct alternative/combination of alternatives is
(1) only (a)
(2) only (c)
(3) only (b), (c) and (d)
(4) only (a) and (d)
(5) (a), (b), (c) and (d)

18 When natural selection results in a shift towards the average of a range of genetic expressions for a particular trait, an evolutionary biologist would credit ... .

(1) stabilising natural selection
(2) discontinuous natural selection
(3) disruptive natural selection
(4) directional natural selection
(5) co-evolution

Study unit 5 – The ecology of biological communities

19 A shark is **least** likely to be killed ... .

(1) by a predator
(2) for sport
(3) out of fear
(4) for food
(5) for their jaws

20 In forests maintained by intermittent fires, ...

(1) the large trees are fireproof
(2) fires leave the low-lying vegetation and burn the tree crowns
(3) some species release seeds only after exposure to intense heat
(4) it takes up to a decade for new vegetation to grow
(5) fires burn the low-lying vegetation and leave the tree crowns

21 A population crash occurs when ... .

(1) a population approaches its carrying capacity
(2) environmental resistance comes into play gradually
(3) resources are essentially unlimited
(4) a population overshoots carrying capacity and environmental pressures take their toll
(5) the population growth rate slows

22 K-strategists … .

(1) are more responsive to environmental changes than R-strategists
(2) exhibit fast rates of evolution
(3) are generally less adaptable to change than R-strategists
(4) reach reproductive age rapidly

Study unit 6 – Humankind: the ultimate consumer

23 Of the following human activities, the one which probably contributes **least** to soil erosion is ... .

(1) urbanisation
(2) off-road vehicles
(3) sustainable agriculture
(4) logging
(5) clearing forests

24 Initial inputs of energy, water, fertilizer and pesticides on high-yield crop varieties may initially have dramatic results. At some point, however, even with additional inputs, the yields level off. This result best illustrates ... .

(1) the tragedy of the commons
(2) that prevention strategies work better in the long run than treatment strategies
(3) the principle of diminishing returns
(4) the first law of thermodynamics
(5) the second law of thermodynamics

25 The concept of malnutrition applies to people who ... .

(1) eat less than the basic minimum number of daily calories
(2) eat balanced meals
(3) eat too much
(4) suffer from poor food quality

(5) eat too much protein

26 **Most** of the commercial fishing catch comes from ... .

(1) freshwater rivers
(2) coastal waters
(3) the open sea
(4) the abyssal zone

Study unit 7 – Fresh water: the earth's most precious resource

27 Throughout the world, the **most** water is used for ... .

(1) irrigation
(2) industrial processes
(3) the needs of animals and humans
(4) transportation
(5) the cooling towers of power plants

28 Which one of the following alternatives does **not** represent a property of water?

(1) Liquid water changes temperature very quickly.
(2) Water is an important solvent.
(3) Water expands when it freezes.
(4) Water can filter UV light.
(5) Water is cohesive.

29 Large dams and reservoirs ... .

(1) reduce the danger of flooding upstream
(2) are inexpensive to build
(3) cannot be used for outdoor recreation
(4) can be used to provide electric power

30 The **main** human activity that increases flooding is ... .

(1) constructing dams
(2) directing stream flow
(3) destroying vegetation
(4) irrigation
(5) urbanisation

Study unit 8 – Energy drives it all

31 Natural gas has a ... net useful energy yield and is a ... fuel compared to coal.

(1) high; dirty
(2) high; clean-burning
(3) low; dirty
(4) low; clean-burning

32 Geothermal energy can be used for all of the following purposes **except** ... .

(1) heating space
(2) producing electricity
(3) transportation fuel
(4) producing high-temperature heat for industry

33 Which country leads the world in using wood as an energy source?

(1) Canada
(2) Sweden
(3) China
(4) Brazil
(5) Germany

34 Oil is widely used because it ... .

(a) is relatively cheap
(b) is easily transported
(c) has a high net useful energy yield
(d) has an artificially low cost

The correct alternative/combination of alternatives is
(1) only (a)
(2) only (b) and (c)
(3) only (c) and (d)
(4) only (a), (c) and (d)
(5) (a), (b), (c) and (d)

Study unit 9 – The air we breathe

35 Of the following strategies to reduce emissions of pollutants from stationary sources, the one that is **least** likely to help in the long run is ... .

(1) burning low-sulphur coal
(2) removing sulphur from coal
(3) dispersing pollutants above the thermal inversion layer
(4) shifting to less polluting fuels
(5) converting coal to a liquid or gaseous fuel

36 There is now general agreement that the **best** way of treating undamaged asbestos in buildings is to ... .

(1) remove it immediately
(2) treat it with chemicals that will dissolve it
(3) burn it
(4) seal or wrap it to prevent release of fibres

37 The frequency and severity of smog in an area depend **least** on ... .

(1) the local climate and topography
(2) fuels used in industry, heating and transportation
(3) the size of the ozone hole over Antarctica
(4) the density of the population
(5) open fires

38 Photochemical smog is formed when primary pollutants interact with ... .

(1) sunlight
(2) water vapour
(3) sulphur dioxide
(4) oxygen
(5) carbon

Study unit 10 – Destroying the earth with waste

39 In a low-waste approach, which one of the following strategies should be given **top** priority?

(1) incinerate
(2) reuse
(3) reduce
(4) bury
(5) recycle

40 The **least** desirable final resting place for a used tyre is in ... .

(1) the foundation of a low-cost passive solar home
(2) an asphalt pavement
(3) an incinerator to produce electricity
(4) a landfill

41 Of the following materials, the **most** difficult to recycle is … .

(1) glass
(2) plastic
(3) paper
(4) aluminium
(5) cardboard

42 Of the following methods of reducing hazardous wastes, the **most** desirable is ... .

(1) recycling and reuse of hazardous wastes
(2) substitution with safer products that do not produce hazardous wastes
(3) conversion into less hazardous and non-hazardous materials
(4) incineration
(5) perpetual storage

Study unit 11 – In for the kill

43 All the characteristics that are mentioned below would make a species more prone to extinction **except** ... .

(1) low population density
(2) small body size
(3) specialised niche
(4) low reproductive rate
(5) fixed migratory patterns

44 You are studying species diversity in the Caribbean islands. Which island would you expect to have the largest number of species?

(1) a large island near the mainland
(2) a large island far removed from other sites
(3) a medium-sized island in the middle of an island chain
(4) a small island far removed from other sites
(5) a medium-sized island near the mainland

45 In view of long-term sustainability, wildlife managers have to make plans based on all of the following principles **except** ... .

(1) ecological succession
(2) food and habitat requirements for each species
(3) laws of thermodynamics
(4) the number of potential hunters
(5) wildlife population dynamics

46 Which one of the following processes leads to an **increase** in biodiversity?

(1) habitat degradation
(2) phosphate pollution of streams
(3) the elimination of exotic vegetation
(4) acid deposition
(5) erosion

Study unit 12 – For those who come after us

47 People living in poverty need fuelwood and cut trees and this results in deforestation and accelerated soil erosion. People burn dried animal dung and crop residues as fuel sources, soil nutrients are depleted, crops suffer and hunger and malnutrition contribute to poverty. This sequence is **best** described as ... .

(1) beneficial positive feedback
(2) harmful positive feedback
(3) a figure eight
(4) beneficial negative feedback
(5) harmful negative feedback

48 Forests remove ... from and add ... to the atmosphere.

(1) oxygen; carbon dioxide
(2) nitrogen; oxygen
(3) carbon dioxide; sulphur dioxide
(4) carbon dioxide; oxygen

(5) nitrogen; carbon dioxide

49 The fuelwood crisis in developing countries is associated with all of the following alternatives **except** increased ... .

(1) deforestation
(2) soil erosion
(3) burden on poor women
(4) land productivity

50 Which one of the following statements about tropical forests is **false**?

(1) Brazil, Indonesia, Zaire and Peru have more than half of the world's tropical forests.
(2) More than half of the world's tropical forests have already been cleared or degraded.
(3) Reforestation ensures that tropical forests are being used on a sustainable-yield basis.
(4) Accurate evidence about the rate of destruction of tropical rainforests is produced by satellite sensors.

Total of section A: 50

Section B

INSTRUCTIONS

This section has to be answered in the examination book supplied to you.

This section consists of six questions counting 10 marks each. You have to answer **any five** of these questions.

Length guideline: 200 to 250 words (1 page) for each answer that counts 10 marks.

QUESTIONS

1. Explain why you agree or disagree that each member of the human species has a right to use as many resources as they want. Relate your answer to the environmental worldviews you learnt about in this module. [10]

2. List four advantages and four disadvantages of using plastics and provide two reasons why so few plastics are recycled. [10]

3a List the three factors that determine the harm caused by pollutants and very briefly explain why there is no "away" as a repository for pollution. (5)

3b What causes the largest loss of energy from an ecosystem: a herbivore eating a plant or a carnivore eating an animal? Explain. (5) [10]

4. You are a defence attorney arguing in court for sparing an undeveloped, old-growth tropical rainforest from destruction by development. Write your closing statement in defence of this ecosystem. [10]

5. Do you agree or disagree with the argument by developing countries that developed countries should bear the brunt of reducing CO_2 emissions because they produce much more of these emissions than developing countries? Explain. [10]

6. List (a) eight ways of preventing or reducing tropical deforestation and degradation and (b) two ways of restoring degraded tropical forests. [10]

Total of section B: 50

[TOTAL OF PAPER: 100]

6 FEEDBACK ON ASSIGNMENT 02

Question 1

a *Briefly differentiate between passive and active solar heating systems.* (4)

A **passive solar heating system** absorbs and stores heat from the sun directly within a well-insulated structure without the need for pumps or fans to distribute the heat.
An **active solar heating system** absorbs energy from the sun by pumping a heat-absorbing fluid (such as an anti-freeze solution) through special collectors usually mounted on a roof or on special racks to face the sun.

Mark allocation

- Correct description of active solar heating systems = 2 marks
- Fair description of active solar heating systems = 1 mark
- No/incorrect description of active solar heating systems = 0 marks

Mark allocation

- Correct description of passive heating systems = 2 marks
- Fair description of passive heating systems = 1 mark
- No/incorrect description of passive solar heating systems = 0 marks

The above answer comes from page 289 in Miller (2011).

b *List four ways you can save energy in your current place of residence.* (2)

There are a variety of ways, methods and approaches to save energy in a home, residence, flat, etc. These include using insulation, sealing gaps in windows, using energy-saving light bulbs and closing doors when heating or cooling a room.

Mark allocation

- Valid/appropriate method to reduce/save energy in place of residence = ½ mark each

Figure 16-9 on page 287 in Miller (2011) will assist in answering this question.

c *Miller (2011) lists a number of renewable energy options as an alternative for non-renewable energy sources. In a well-motivated essay, discuss which renewable energy option, in your opinion, is best for South Africa currently.* (14)

[20]

There are a number of renewable resources that can be used as an alternative. These include wind, solar, hydropower and biofuel. However, with each alternative option, there are a number of pros and cons. Cost, land use and environmental impacts are among the most important concerns to discuss. You had to present facts and reasons why you chose a particular renewable energy.

Mark allocation

- Excellent discussion of a renewable energy option for South Africa = 14 marks
- Good discussion of a renewable energy option for South Africa = 10 marks
- Fair discussion of a renewable energy option for South Africa = 7 marks
- Poor discussion of a renewable energy option for South Africa = 3 marks
- No/incorrect discussion of a renewable energy option for South Africa = 0 marks

The above answer comes from chapter 16 in Miller (2011).

Question 2

Congratulations! You are in charge of preventing the premature extinction of the world's existing species from human activities. What three things would you do to accomplish this goal? Explain each.

[20]

The question required you to think about three factors relating to human activities, namely (1) population growth, (2) affluenza and (3) pollution, which may result in the premature extinction of species.
You could have discussed these three root causes in detail using the following concepts (see page 432 in Miller (2011)):

1. *Environmental laws*
   In conjunction with existing legislation such as CITES and CBD, create new laws focused on preserving biodiversity.
2. *Refuges*
   Use wildlife refuges, gene banks, botanical gardens, zoos and aquariums to preserve endangered species of fauna and flora.
3. *Precautionary principle*
   This principle states that we should take measures to reduce harm to the environment and human health even if some of the cause-and-effect relationships have not fully been scientifically established.

By controlling these factors, you could prevent the premature extinction of the world's existing species from human activities.

Mark allocation

- Introduction (What is premature extinction?) = 2 marks
- Root causes = 3 marks
- Discussion on laws = 4 marks
- Discussion on refuges = 4 marks

- Discussion on precautionary principle = 4 marks
- Scale of intervention for each (local, regional, global) = 3 marks

Bear in mind that the above answer is only a brief outline, but should provide guidance on the question. See pages 415 to 418 in Miller (2011).

Question 3

Explain why reduction is a better strategy than cleanup to cope with solid and hazardous waste problems. **[20]**

Core principles for environmentalists with regard to waste and hazardous waste are the three R's: reduce, reuse and recycle. Of these, reducing waste is the most important and should be given priority. By reducing the production of solid and hazardous waste in society and industry, the need to cope with this waste is reduced. Reducing the production of waste materials will aid in better controlling and managing the waste that is introduced into the environment. Additionally, the wastes that are produced require the use/exploitation of further energy and resources to get rid of them (e.g. incineration, burying hazardous waste.) Focus should also be placed on reducing the amount of hazardous waste produced in manufacturing and industry. Where possible, this waste should also aim to be recycled and reused. Integrated waste management should be our last priority. However, most countries today focus more on waste management than on waste reduction.

Mark allocation

- Discussion of waste reduction = 15 marks
- Discussion of integrated waste management = 5 marks

Question 4

a *What is an ecological footprint? What useful information does it give us?* (4)

An ecological footprint is the amount of biologically productive land and water required to supply a population with the renewable resources it uses and to absorb or dispose of the wastes from this resource use. It measures the average environmental impact of populations in different countries and areas. People in developed countries typically use more resources on a daily basis and therefore their ecological footprint would be bigger than that of people from a developing country.

Mark allocation

- Definition = 2 marks
- Description of useful information = 2 marks

b *Based on figure 1 below, explain why the total and per capita ecological footprints of India and the United States are so different from each another.* (16)

[20]

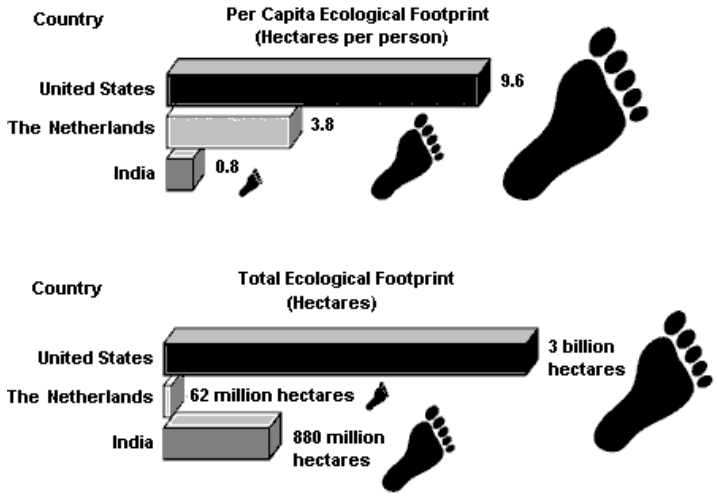

Figure 1: The ecological footprints of a collection of countries. Note: The size of the populations of India and the United States is 1 181 and 309 million people, respectively. The areas of India and the United States are 328.7 and 962.9 million hectares, respectively (http://www.wikipedia.co.za, accessed on 07/07/2010).

The essence of the answer is that the per capita ecological footprint (i.e. the ecological footprint per person) in developed countries such as the USA and the Netherlands is much larger than that of developing countries such as India (as shown in the top section of the figure). In **developed** countries (top section of the figure), high rates of per capita resource use and resulting high levels of air pollution and environmental degradation per person have a huge environmental impact and consequently a huge ecological footprint (per capita and total, such as for USA – see the top and bottom sections of the figure). In **developing** countries, population size and the resulting degradation of renewable resources as the poor struggle to stay alive are the key factors in determining environmental impact. Per capita (top section of the figure) resource use is low and environmental impact (and therefore the ecological footprint) in these countries is small, but due to their population size, the total environmental impact (and ecological footprint – see the bottom section of the figure) can become quite big – the reason why the total ecological footprint of India by far exceeds that of the Netherlands (bottom section of the figure).

Mark allocation

- Explanation of ecological footprint in developed countries (USA) = 8 marks
- Explanation of ecological footprint in developing countries (India) = 8 marks

The above information comes from chapter 1 (pages 14 to 16) in Miller (2011).