

RHODES UNIVERSITY
DEPARTMENT OF ENVIRONMENTAL SCIENCE

EXAMINATION: NOVEMBER 2012

ENVIRONMENTAL SCIENCE 202
PAPER 2

Internal Examiners: Prof. W. Ellery MARKS: 100
Dr S. Shackleton DURATION: 3 HOURS
Dr N. Griffin

External Examiner: Dr P. O'Farrell

Instructions:

1. Answer BOTH sections, noting the choice within sections
 2. Answer each section in a separate answer book
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SECTION A: Climate change (50 marks)

Question 1: Answer TWO of the following questions for 5 marks each:

- 1.1. Explain why the last few UNFCCC COPs has received particular interest and media attention. (5)
- 1.2. Explain South Africa's approach to and plans for GHG emissions reduction and the targets that have been set for the country. (5)
- 1.3. Using an example of each, explain the difference between stable and radioactive isotopes and mention the typical use of these in climate change studies. (5)
- 1.4. Explain the term "climate change proxy" and describe two proxies used in climate change studies. (5)

(Total = 10 marks)

Question 2: Answer TWO of the following questions for 10 marks each:

- 2.1. Explain the concept of radiative forcing and describe the factors that are considered to contribute to global warming and state their estimated contributions. (10)
- 2.2. Explain carbon dating of organic sediments and describe the use of micro- and macro-fossils in organic sediments in helping to understand past climate change. (10)
- 2.3. Provide a brief overview of extraterrestrial factors that affect the global climate system. (10)

(Total = 20 marks)

Question 3: Answer ONE of the following questions for 20 marks:

EITHER

- 3.1. Describe the process of "fracking" and argue for or against this mining activity in the Karoo region of South Africa on environmental, social and economic grounds. (20)

OR

- 3.2. On the basis of scientific evidence, present an argument for or against the suggestion that "human activities contribute directly to global warming". (20)

(Total = 20 marks)

SECTION B: Water resources (50 marks)

Question 4: Answer TWO of the following questions for 5 marks each:

- 4.1. Briefly review how pyrites modify water quality and what the major consequences of this are. (5)
- 4.2. Briefly discuss evidence for dams as greenhouse gas producers, and explain how this may (or may not) happen. (5)
- 4.3. After ice, the majority of potentially available freshwater is groundwater. Give advantages and disadvantages of using groundwater as a source of freshwater. (5)
- 4.4. Environmental flow requirements are increasingly included in management plans for rivers. Define environmental flow requirements, and outline issues that need to be considered when suggesting an environmental flow requirement for a South African river. (5)
- (Total = 10 marks)**

Question 5: Answer ONE of the following questions for 10 marks:

EITHER

- 5.1. Interbasin transfers are liable to become more common as localised water stress increases. Describe a typical interbasin transfer, and discuss the advantages and disadvantages of these schemes. (10)

OR

- 5.2. Eutrophication of aquatic systems is a growing problem in South Africa. Write a brief review of eutrophication of lentic and lotic systems, ensuring in your answer that you discuss both the causes and the effects of eutrophication. Illustrate your answer with examples. (10)
- (Total = 10 marks)**

Question 6: Answer ONE of the following questions for 30 marks:

EITHER

- 6.1. Review, using examples, the environmental consequences of large dam construction and operation. In your answer, include both positive and negative consequences (where appropriate). Contrast these with the economic consequences of large dam construction and operation. (30)

OR

- 6.2. An inevitable consequence of current water management practices is the modification of the natural flow regime. Discuss the changes to natural flow regimes resulting from various management practices and the consequences thereof. Consider changes to water quality as well as quantity in your answer. Given the consequences, discuss whether the management practices that you present are justified. (30)

(Total = 30 marks)

END OF EXAMINATION PAPER
