

RHODES UNIVERSITY
DEPARTMENT OF ENVIRONMENTAL SCIENCE

EXAMINATION: JUNE 2014

ENVIRONMENTAL SCIENCE 201
PAPER 1

Internal Examiners: Dr G. Cundill

MARKS: 100
SUBMINIMUM: 35

DURATION: 3 HOURS

External Examiner: Dr P. O'Farrell

Instructions:

1. This paper has three sections (A, B, C). Answer **EVERY SECTION**, noting the choices within sections.
2. Answer each section in a **SEPARATE** answer book.
3. Read the instructions for each section carefully.
4. **NUMBER ALL ANSWERS CORRECTLY.**
5. Wherever possible use examples to back-up your answers.
6. At the end of the examination, place all answer book and Appendices inside the book used to answer **SECTION A.**
7. This paper has **4 PAGES.**

PLEASE DO NOT TURN OVER THIS PAGE UNTIL TOLD TO DO SO.

SECTION A: Introduction to Environmental Science
(40 marks)

(Answer all questions in this section, taking note of the choice in question A3)

QUESTION A1 (10 MARKS)

Illustrate and describe different models for integrative thinking across social, ecological and economic systems. (10 marks)

QUESTION A2 (10 MARKS)

Discuss some of the key challenges faced by environmental scientists in dealing with environmental change. (10 marks)

QUESTION A3 (20 MARKS)

(Answer **TWO** of the following three questions)

1. What arguments have been put forward *in support* of greater inter/transdisciplinary research in the environmental sector? (10 marks)

 2. In what ways do material culture, modes of subsistence and belief systems lead to *biodiversity and culture being inter-dependent*? Use examples to substantiate your answer. (10 marks)

 3. Participation of rural communities in decision-making occurs along a continuum. Illustrate this continuum, and discuss at least two of the justifications put forward in support of participation. (10 marks)
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SECTION B: Ecosystem services and human well-being
(20 marks)

(Answer both questions B1 and B2 noting internal choices in B1)

QUESTION B1 (5 MARKS)

(Answer **ONE** of the following two questions)

1. With reference to examples, discuss what regulating ecosystem services are and why they matter to society. (5 marks)

or

2. What are the constituents of '*human well-being*'? (5 marks)

QUESTION B2 (15 MARKS)

Drawing on examples, discuss some of the potential impacts of a *loss of provisioning and regulating ecosystem services* on human well-being. (15 marks)

SECTION C:

Systems thinking, complexity and sustainability (40 marks)

QUESTION C1 (10 MARKS)

(answer TWO of the following questions)

1. What does a *systems approach* to environmental issues involve? (5 marks)
2. With reference to examples, explain what a *positive feedback* loop is. (5 marks)
3. Why is an awareness of *thresholds* between alternative stable states important for environmental managers? (5 marks)
4. Why is *connectivity* an important consideration in the context of resilience? (5 marks)

QUESTION C2 (30 MARKS)

(Answer TWO of the following questions)

1. What are *regime shifts between alternative stable states* in an ecosystem? Discuss with reference to at least *two* detailed *examples*. (15 marks)
2. Discuss the key differences between the 'Limits to Growth' model and the 'Planetary Boundaries' concept in terms of how each approach *leads us to think about sustainability*. (15 marks)
3. Eric Berlow argues that understanding complexity can lead to simpler and more effective solutions to environmental problems. Discuss the key features of a complex system, and reflect on how understanding these features can lead to simpler and more effective solutions. (15 marks)

END OF EXAMINATION PAPER