

**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)
-

**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**