

**RHODES UNIVERSITY
DEPARTMENT OF ENVIRONMENTAL SCIENCE**

EXAMINATION: JUNE 2014

ENVIRONMENTAL SCIENCE 301

PAPER 1

Internal examiners: Prof J Gambiza

MARKS: 100

Mr Mike Powell

DURATION: 3 HOURS

Dr Sheunesu Ruwanza

External examiner: Dr P. O'Farrell

GENERAL INSTRUCTIONS TO CANDIDATES

1. Answer **EVERY** section, noting the choice within sections.
 2. Answer each section in a **SEPARATE** answer book.
 3. Time management is very important. The value of the mark for each question should be used as a rough guide to the amount of time allocated to answer the question.
 4. It is in the candidate's interest to write legibly.
 5. At the end of the examination, place all answer books inside the book used to answer **SECTION A**.
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PLEASE DO NOT TURN OVER THIS PAGE UNTIL TOLD TO DO SO.

SECTION A: (30 marks)

Please answer any THREE questions

Question A1: **10 marks**

What are the characteristics of effective monitoring programmes?

Question A2: **10 marks**

Explain the challenges of developing a terrestrial index of ecological integrity.

Question A3: **10 marks**

Use examples to explain the concept of resource management domains.

Question A4: **10 marks**

Justify the need for environmental monitoring.

Question A5: **10 marks**

Explain how Epstein *et al.* (2013) have suggested ecological perspectives should be integrated with Ostrom's (2009) social-ecological framework.

SECTION B (20 marks)

Please answer ONE question

EITHER

Question B1: **20 marks**

Describe the relevancy of monitoring in the context of ecological restoration, specifically highlighting:

- (a) What philosophical models or rationale might be employed in the restoration; **[5 marks]**
- (b) Ecological tipping points and ecological thresholds, and **[5 marks]**
- (c) A South African case study where payment for ecosystem services is the incentive mechanism. **[10 marks]**

OR

Question B2: **20 marks**

- (a) Outline the criteria that can be used for selecting indicators used in monitoring ecological restoration. **[5 marks]**
 - (b) Select and discuss appropriate indicators that can be used for monitoring the ecological restoration of river systems previously invaded by alien invasive trees. **[15 marks]**
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SECTION C (50 marks)

Please answer any TWO questions

Question C1: **25 marks**

Discuss the key issues to consider in the use and development of ecosystem service indicators.

Question C2: **25 marks**

Discuss the challenges of locally-based monitoring of natural resources.

Question C3: **25 marks**

Evaluate the usefulness of Collins *et al.*'s (2011) press-pulse dynamics framework for monitoring the environment.

END OF EXAMINATION PAPER