RHODES UNIVERSITY

DEPARTMENT OF ENVIROMENTAL SCIENCE

EXAMINATION: JUNE 2012

ENVIRONMENTAL SCIENCE 201

PAPER 1

Internal examiners: Dr Sheona Shackleton
Prof Fred Ellery

External examiner: Dr Patrick O'Farrell

Marks: 100

Duration: 3 hours

GENERAL INSTRUCTIONS

1. This paper has three sections (A, B, C). Answer **EVERY SECTION**, noting the choices within sections.
2. Answer each section (A, B, C) 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 books and Appendices inside the book used to answer **SECTION A.**
7. This paper has **FOUR** pages.

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

SECTION A: Introduction to Environmental Science

(30 marks)

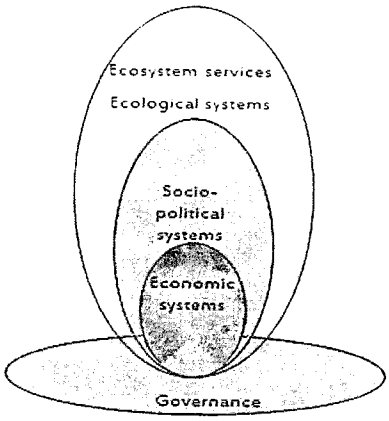
(Answer any **THREE** questions from this section)

QUESTION A1 (10 marks)

Considering the different types of environmentalism, discuss the differences between an ***environmental scientist*** and an ***environmentalist***.

QUESTION A2 (10 marks)

a) Explain the diagram below and indicate how this relates to ***strong sustainability***. (4 marks)



b) Why is ***stakeholder participation*** in environmental projects important and what are some of the challenges associated with it? (6 marks)

QUESTION A3 (10 marks)

Define ***transdisciplinarity*** and discuss why it is a necessary approach to understanding complex social-ecological systems. Support your answer with an example.

QUESTION A4 (10 marks)

Local Ecological Knowledge (LEK) is non-scientific and redundant with regard to natural resource management. Provide an argument to counter this statement drawing on examples and case studies.

SECTION B:

Ecosystems services, human well-being and complex social-ecological systems

(35 marks)

(Answer **BOTH** questions from this section noting internal choices)

QUESTION B1 (20 marks)

(Answer any **FOUR** of the following)

a) How do ***feedbacks*** work in systems? (**5 marks**)

b) What is meant by ***regulating services*** and why are they often neglected? (**5 marks**)

c) List five ecosystem services provided to local people by Eritrean riverine forests. (**5 marks**)

d) What ***properties*** separate complex systems from engineering systems? Use examples in your answer. (**5 marks**)

e) Explain how over-fishing can result in a shift from a coral dominated system to an algae dominated one (**5 marks**)

f) Explain, using examples, the direct and indirect drivers of ecosystem change. (**5 marks**)

QUESTION B2 (15 marks)

(Answer **EITHER** (a) **OR** (b))

EITHER

a) How can ***adaptive management*** help to build resilience and avoid thresholds? What are the links between ***resilience*** and ***thresholds***? Define each of these terms and describe the factors that contribute to resilience? Use examples in your answer.

OR

b) The example of ***Easter Island*** is commonly used to illustrate the consequences of ignoring feedbacks and crossing a threshold in a social-ecological system. Discuss.

SECTION C: Ecological systems

(35 marks)

(Answer **BOTH** questions, noting internal choices)

QUESTION C1 (10 marks)

(Answer **EITHER** (a) **OR** (b))

EITHER

a) Briefly describe the difference between ***state factors*** and ***interactive controls*** as determinants of ecosystem structure and function, giving examples of each.

OR

b) Draw the ***adaptive cycle*** in terms of the axes of "potential for change" and "connectivity", and explain the cycle in terms of ecosystems and how they typically behave.

QUESTION C2 (25 marks)

(Answer **EITHER** (a) **OR** (b))

EITHER

a) Use the example of the ***Okavango Delta*** to explain the view that in ecosystems it is often the case that "The more things change the more they stay the same". Your answer should largely focus on why, despite the high potential for salinisation in the Okavango, it remains a freshwater ecosystem.

OR

b) Describe the importance of understanding ***environmental change*** and explain ***FOUR*** different techniques that are available to examine environmental change. Explain the principles used in each technique case by focusing particularly on the data that are analysed and interpreted to quantify environmental change. Indicate the time scale over which particular techniques can be applied and provide an example of each.

END OF THE EXAMINATION PAPER