



**NAMIBIA UNIVERSITY  
OF SCIENCE AND TECHNOLOGY**

**FACULTY OF HEALTH, NATURAL RESOURCES AND APPLIED SCIENCES**

**DEPARTMENT OF AGRICULTURE AND NATURAL RESOURCES SCIENCES**

<b>QUALIFICATION: BACHELOR OF NATURAL RESOURCES MANAGEMENT</b>	
<b>QUALIFICATION CODE: 07BNRS</b>	<b>LEVEL: 7</b>
<b>COURSE CODE: CSE621S</b>	<b>COURSE NAME: Conservation Ecology 2</b>
<b>DATE: January 2023</b>	
<b>DURATION: 3 hours</b>	<b>MARKS: 150</b>

<b>SECOND OPPORTUNITY / SUPPLEMENTARY EXAMINATION QUESTION PAPER</b>	
<b>EXAMINER(S)</b>	Mr Richard Kavari, Prof Theo Wassenaar and Mr Jeremia K.L. Amutenya
<b>MODERATOR:</b>	Prof. Morgan Hauptfleisch

<b>INSTRUCTIONS</b>
<ol style="list-style-type: none"><li>1. Answer ALL the questions.</li><li>2. Write clearly and neatly.</li><li>3. Number the answers clearly.</li></ol>

**PERMISSIBLE MATERIALS**

1. Examination question paper
2. Answering book
3. Calculator

**THIS QUESTION PAPER CONSISTS OF 4 PAGES** (Excluding this front page)

### **QUESTION 1**

Write short notes to define or explain the following ecological terms:

- 1.1. Herbivory (1)
- 1.2. Regime shifts (1)
- 1.3. Landscape ecology (2)
- 1.4. Ecosystem management (2)
- 1.5. Population dynamics (1)
- 1.6. Habitat fragmentation (1)

**[8]**

### **QUESTION 2**

Differentiate between the following ecological terms.

- 1.1. Keystone species vs. Ecosystem engineer (4)
- 1.2. Stochastic vs. Deterministic (with reference to causes of local extinction of species) (2)
- 1.3 Pre vs. post reproductive stage (2)
- 1.4 Emigration vs. Immigration (2)
- 1.5 Natality vs. Mortality (2)

**[12]**

### **QUESTION 3 Ecosystem Health and Management**

- 3.1. Outline seven critical steps to ensure effective ecosystem management. (7)
- 3.2. Explain how the concept of ecosystem management can be used in the environmental impact assessment sector. (5)

**[12]**

### **QUESTION 4 Dryland ecology and habitat suitability**

- 4.1. Using a diagram, explain the differences between “fundamental niche” and “realised niche” and how a stressor may change this. (5)

- 4.2. With reference to your assignment on the topic of the limits of adaptability, discuss one example of a species that will be affected by climate change, explaining the main mechanism through which it will be affected, and how it will be affected. (5)
- 4.3. Discuss the various ecophysiological and anatomical aspects of the adaptation or non-adaptation of the Namibian plant Welwitschia mirabilis to the extreme water stress in the Namib Desert. Explain why this is remarkable. (5)
- 4.4. Explain the difference and relationship between the habitat and the distribution of a species. (3)
- 4.5. Explain, how a habitat suitability model can be used to assess the threat of invasion by an exotic (non-native) species or to confirm its conservation status. (2)
- 4.6. Name and discuss one example where climate change has had an effect on the physiology and/or development of an organism and one example of where climate change has altered the phenology of plants or animals. (4)
- 4.7. True or false: the Succulent Karoo Biome will decrease in spatial extent within Namibia's borders. (1)

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**QUESTION 5 Population Ecology and Management**

- 5.1. Monitoring is the most neglected, but one of the most important aspects of management. Explain this statement. (2)
- 5.2. The following is a hypothetical life table for a roan antelope population.

X	$N_x$	$l_x$	$d_x$	$q_x$
0-1	800	1.000		
1-2	540		B	C
2-3	350	A		

- a) Calculate A, B and C on the table above. Show your calculations and convert your answers to the nearest three decimal places. (3)
- b) If the  $l_x$  for age interval 2-3 is 0.600, what would have been the original population? (1)
- c) Calculate  $p_x$  for age group 1 – 2 years. (1)
- d) If the average/mean number of off-springs per individual for age group

2-3 is 2, what would be the reproductive rate for that age group? (2)

5.3. What is **Basal cover** and assess its importance for Natural Resource Managers to consider or monitor? (2)

5.4. The following data were obtained from a 48 hour waterhole census. Briefly discuss the age structure of each population, giving possible reasons. (6)

	Juveniles	sub-adults	adults
Kudu	14	16	25
Roan antelope	6	8	19
Wildebeest	7	5	52

5.5. A population of 30 sable antelope is introduced to a game farm. Draw the shape of the population growth curve you would expect for this population for 15 years, given that the carrying capacity is estimated to be 210, and assuming that the population grows well. Include the labels for the axes. (5)

5.6. Draw a diagram to illustrate how an increase in buffalo population may affect the mortality rate of roan calves. (5)

5.7. A population of 20 roan antelope is introduced to a game farm. Calculate the estimated population size after 30 years, given an estimated growth rate ( $R_0$ ) (based on research in other areas) of 1.25. (2)

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### QUESTION 6 Disturbance and Response

6.1. The Intermediate Disturbance Hypothesis is widely used to explain the effect of disturbances on species diversity in Ecology. Briefly expand on the Intermediate Disturbance Hypothesis. (6)

6.2. **List four (4)** factors that shape a Savannah ecosystem. (4)

6.3. **Name and explain six (6)** factors influencing fire behaviour. (6)

6.4. **Name four** characteristics of pioneer species. (2)

6.5. Compare the characteristic of equilibrium and non-equilibrium systems using the following parameter (abiotic patterns, plant-herbivore interactions, population



patterns and community/ecosystem characteristics). (8)

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**QUESTION 7 From ecology to management at landscape level**

7.1. Discuss at least two ways in which landscape ecology is used in biological conservation and give an example. (5)

7.2. Ecological restoration attempts to assist disturbed areas to recover their pre-disturbance character, or something similar. Discuss why and how a landscape ecology approach can benefit the theory and practice of ecological restoration. (5)

7.3. Define the concept of patch dynamics and assess its usefulness for conservation. (5)

7.4. Explain the two main processes through which a metapopulation functions in the overall conservation of a species. (2)

7.5. Discuss the link between island biogeography theory and metapopulations. (3)

7.6. Explain the meaning of a corridor in ecology and provide a Namibian example. (2)

7.7. True or false: an understanding of basic ecological processes is not a critical skill for a natural resource manager. (1)

[23]

**QUESTION 8 The ecology of a changing world**

8.1. Explain how the arid climate of Namibia, coupled with mismanagement (e.g. overgrazing) of rangelands can lead to desertification and habitat loss. (10)

8.2. Develop a brief plan on how you would control and manage invasive species in a natural ecosystem. (5)

[15]

**Total: 150**

**End!**