



**NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY**

FACULTY OF HEALTH, NATURAL RESOURCES AND APPLIED SCIENCES

DEPARTMENT OF NATURAL RESOURCES SCIENCES

QUALIFICATION: BACHELOR of NATURAL RESOURCE MANAGEMENT (NRM)	
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SESSION: JULY 2025	PAPER: THEORY
DURATION: 3 HOURS	MARKS: 150

SECOND OPPORTUNITY EXAMINATION QUESTION PAPER	
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INSTRUCTIONS
<ol style="list-style-type: none">1. Answer ALL the questions.2. Read all the questions carefully before answering.3. Number the answers clearly4. Make sure your name and surname, question number and the date appear on the answer script.5. Please ensure that your writing is legible, neat and presentable.

THIS QUESTION PAPER CONSISTS OF 6 PAGES (Including this front page)

QUESTION 1

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

- 1.1. Predation (1)
 - 1.2. Co-evolution (2)
 - 1.3. Ecotones (2)
 - 1.4. Ecosystem engineers (3)
 - 1.5. Trophic cascade (2)
- [10]

QUESTION 2

Explain the difference between the following pairs of terms.

- 2.1. Sympatric vs. Allopatric (2)
 - 2.2. Hemiparasites vs Holoparasites (2)
 - 2.3. Intraspecific vs. Interspecific competition (2)
 - 2.4. Grazing food chain & Detritus food chain (2)
 - 2.5. Structural vs. Functional connectivity (2)
- [10]

QUESTION 3

Match definitions or examples with correct words (write the number and alphabet). (10)

Definitions or examples

- 1.1. The environmental factors that support (and influence) the growth, survival and reproduction of a species.
- 1.2. Species that create, modify and maintain habitats, by shaping the habitat to their own needs, subsequently altering the availability of microhabitats, food, water, sunlight and shelter for other species, thus making other species' existence possible in a community.
- 1.3. A hypothesis that predicts that local species diversity is maximised when an ecological disturbance is neither too rare nor too frequent.
- 1.4. The sequence of events related to survival and reproduction that occur from birth through death.
- 1.5. A type of survivorship curve in which individuals tend to live out their physiological life span and produce few offspring but provide extensive parental care.
- 1.6. A species whose geographic distribution is limited to a specific area or spatial unit (such as a country or a biome).
- 1.7. A process in which individual organisms or phenotypes that possess favourable traits are more likely to survive and reproduce.
- 1.8. The process of change in the species structure of an ecological community over time.

Words

- a) Life Histories
- b) Mortality curves
- c) Intermediate Disturbance Hypothesis
- d) Ecosystem engineers
- e) Ecological succession
- f) Landscape connectivity.
- g) Colonisation
- h) Keystone species
- i) Natural selection
- j) Ecological niche
- k) Keystone species
- l) Mortality curves
- m) Endemic species
- n) Dispersal
- o) Population size
- p) Ubiquitous species
- q) Evolution
- r) Type III
- s) Population density
- t) Type I

- 1.9. The number of individuals per unit area.
- 1.10. The degree to which the landscape facilitates or impedes the movement of organisms among patches.

QUESTION 4

Choose the correct answer.

- 4.1. The "O" horizon in a soil profile typically contains: (1)
A. Bedrock
B. Weathered parent material
C. Organic matter
D. Mineral salts
- 4.2. Which soil type is most commonly found in the eastern part of Namibia? (1)
A. Calcisols
B. Gypsisols
C. Arenosols
D. Fluvisols
- 4.3. Which of the following is an example of qualitative chemical defence in plants? (1)
A. Tannins
B. Resins
C. Spines
D. Alkaloids
- 4.4. What is the best definition of an ecological niche? (1)
A. The place where an organism lives
B. The environmental factors that support a species' survival, growth, and reproduction
C. The number of organisms in an ecosystem
D. The competition between different species
- 4.5. Which of the following organisms is an example of a specialist species? (1)
A. Ring-necked dove
B. Camelthorn tree
C. Husab Sand Lizard
D. House sparrow
- 4.6. Which factor is NOT used to define population structure? (1)
A. Age structure
B. Population density
C. Sex ratio
D. Species diversity
- 4.7. What happens when a population reaches its carrying capacity in the logistic growth model? (1)
A. The population keeps increasing indefinitely
B. The population size stabilises as birth rates equal death rates
C. The population stops reproducing
D. The population crashes completely

- 4.8. What is the main factor that has allowed human populations to grow exponentially? (1)
 A. Predation
 B. Resource limitation
 C. Advances in technology and healthcare
 D. Increased competition for resources
- 4.9. What is a defining characteristic of top-down control in an ecosystem? (1)
 A. The abundance of predators controls the population of prey
 B. Plant growth determines the number of herbivores
 C. Competition among primary producers determines ecosystem stability
 D. Climate conditions regulate food availability
- 4.10 Which of the following best defines ecological succession? (1)
 A. The complete extinction of a species in an ecosystem
 B. The replacement of one community by another over time
 C. The spread of invasive species in an ecosystem
 D. A random process with no predictable pattern

[10]

QUESTION 5

Indicate whether the following sentences are true or false.

- 5.1. Increased population density in some animal species leads to increased stress, which can suppress immune function. (1)
- 5.2. Mimicry is a defence strategy where a non-toxic species evolves to resemble a toxic one. (1)
- 5.3. Predator-prey cycles always lead to the extinction of the prey population. (1)
- 5.4. Niche overlap always results in character displacement, where competing species evolve different traits to reduce competition. (1)
- 5.5. Species Distribution Models (SDMs) help predict where a species will likely be found based on environmental factors. (1)
- 5.6. Natality refers to the number of individuals that leave a population due to emigration. (1)
- 5.7. A population pyramid is a graphical representation of the sex ratio only. (1)
- 5.8. A more heterogeneous habitat generally supports greater species diversity. (1)
- 5.9. Top-down and bottom-up control mechanisms are independent of each other and do not interact. (1)
- 5.10. Primary succession occurs faster than secondary succession. (1)

[10]

QUESTION 6 (Units 1: The environment)

- 6.1. **What** is plant-available soil moisture (PAM), and why is it important in arid regions like Namibia? (3)
- 6.2. **Why** is the anthroposphere considered inefficient compared to the biosphere? (3)
- 6.3. Arid soils dominate Namibia's pedosphere. **List and explain** the dominant soil groups of Namibia. (8)

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QUESTION 7 (Unit 3: Species)

- 7.1. **Explain why** the logistic growth curve/model is more realistic in describing population growth than the exponential growth curve/model. (2)
- 7.2. **What** is predator saturation, and how does it help prey species survive predation? (3)
- 7.3. The ecological niche has three distinct meanings among scientists, each with an associated conceptual basis. **Name and explain** these three distinct meanings and indicate which is the most common in nature. (6)

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QUESTION 8 (Unit 4: Populations)

- 8.1. **Define carrying capacity and explain** how it is included in the logistic growth model. (3)
- 8.2. **Explain** how intraspecific competition can lead to changes in the physical traits (phenotypic plasticity) of animals. (2)
- 8.3. In animals, increased crowding and social contact cause stress, which triggers hormonal changes. (6)
- 8.3.1 **Explain** what is meant by increased crowding and social contact in the context of population density. (1)
- 8.3.2 **Describe** the physiological response of animals to stress caused by high population density. (2)
- 8.3.3 **List three (3)** biological consequences of the hormonal changes triggered by this stress. (3)

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QUESTION 9 (Unit 5: Communities)

- 9.1. **What** parameters can one use to measure the size of the community? (3)
- 9.2. **Name** the two attributes ecologists use to measure physiognomy (physical) species diversity. (2)
- 9.3. Answer the questions below using the game count numbers of Etosha National Park, provided in the table below.

Species	Abundance	
	Waterhole 1	Waterhole 2
Elephant	250	59
Roan	123	75
Oryx	105	250
Ostrich	90	86
Kudu	98	39
Warthog	0	8
Blue wildebeest	102	49
Red hartebeest	0	12
Tsessebe	0	3
Steenbok	25	0
Duiker	32	0

- 9.3.1. **What** is the species richness of Khaudum National Park? (1)

- 9.3.2. Using the Bray-Curtis Similarity index (H), compare the similarity (15) of the two waterholes found in Etosha National Park.

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QUESTION 10 (Unit 6: Ecosystems)

- 10.1. **Place/Rank** the following Namibian ecosystems (the Namib Desert, Woodland Savanna in the Zambezi Region, north-eastern part of Namibia and the Highland Savanna, central Namibia, including Windhoek) from the highest to lowest (1 – 3) Primary productivity and **provide** the reasons for your ranking (motivate). In other words, which ecosystem is expected to have the highest, moderate, and lowest primary productivity, and why? (6)
- 10.2. **Describe** the main processes involved in decomposing organic matter in terrestrial ecosystems. In your answer, **identify** the biological and physical agents responsible for each process and explain how these processes contribute to nutrient cycling. (10)

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QUESTION 11 (Unit 7: Landscapes)

- 11.1. **Discuss** the role of humans in the fragmentation of landscapes and the possible consequences of such practices. (4)
- 11.2. **Name and explain** the four (4) elements that make up the structure of a landscape. (8)
- 11.3. Metapopulation dynamics differs from normal population dynamics in that it is governed by two sets of processes operating at two distinct spatial scales. **Name and explain** those processes. (3)

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QUESTION 12 (Unit 8: Global ecology)

- 12.1. Climate change significantly impacts biodiversity, influencing species and ecosystems in multiple ways. **Identify and describe** six major ways in which biodiversity is affected by climate change. (6)
- 12.2. The Millennium Ecosystem Assessment (MEA) presented key findings on the state and trends of global biodiversity. **Summarise** the main findings of the Millennium Ecosystem Assessment regarding biodiversity. (6)

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TOTAL: 150 marks