NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

FACULTY OF HEALTH, NATURAL RESOURCES AND APPLIED SCIENCES

DEPARTMENT OF AGRICULTURE AND NATURAL RESOURCES SCIENCES

QUALIFICATION: BACHELOR OF NATURAL RESOURCE MANAGEMENT	
QUALIFICATION CODE: 07BNRS	**LEVEL:** 7
COURSE CODE: CSE721S	**COURSE NAME:** CONSERVATION ECOLOGY 3
DATE: JANUARY 2023	
DURATION: 3 HOURS	**MARKS**: 80

SECOND OPPORTUNITY EXAMINATION QUESTION PAPER	
EXAMINER(S):	PROF. T. WASSENAAR
MODERATOR:	DR GILLIAN MAGGS-KÖLLING

INSTRUCTIONS
1. Answer ALL the questions. 2. Write clearly and neatly. 3. Number the answers clearly.

PERMISSIBLE MATERIALS

1. Examination question paper
2. Answering book (including additional illustrative material linked to specific questions)

THIS EXAMINATION QUESTION PAPER CONSISTS OF THREE PAGES (excluding front page)

Question 1: Name two key barriers to evidence-based decision-making in NRM. [**4 marks**]

Question 2: Define evidence-based natural resource management, then critically analyse the approach of the researchers in the accompanying piece of text with the title "Flagging Aberrant Sites and Assemblages in Restoration Projects" in terms of the extent to which they used evidence to recommend management decisions. [**10 marks**]

Flagging Aberrant Sites and Assemblages in Restoration Projects

Theo D. Wassenaar,[1,2] Sam M. Ferreira,[1,3] and Rudi J. van Aarde[1,4]

Abstract

The recovery of an ecosystem in response to a restoration program that relies on natural processes may be characterized by heterogeneous changes in species composition and structure. In most cases, such variability is natural and should even be welcomed. However, variability that arises from a specific restoration site, as opposed to randomly from all sites, may indicate problems with the restoration process and may jeopardize the outcome of a project. Here, we describe a technique to flag those sites and assemblages that tend to develop aberrantly. We use data on plant and animal assemblages, collected during routine monitoring operations over several surveys on a chronosequence of rehabilitating dune forests. Using this technique, we show that a bird assemblage on one of the sites at our study area on the coast of southern Africa tends to develop slower than expected. This site is situated farther than others from potential source areas (intact forests) and closer to human habitation. In essence, the technique uses a permutation test to identify ecological variables and assemblages that tend to be more variable than expected. It then focuses on these to identify specific aberrant sites. The technique allows management to concentrate scarce resources to determine the causes of aberrant changes, as well as possible mitigating actions, for specific sites instead of across the board. This cost-efficient rapid assessment technique will lead to improved chances of restoration success. It may be applied in all projects where a chronosequence of sites can be sampled repeatedly, as is often the case in post-mining restoration.

Key words: aberrant changes, dune forest, early detection, mining.

Question 3: Part of a nature reserve near Windhoek burned in an unplanned veld fire. Many people feel that management should in the future keep all fires out. Describe how you will decide whether management should be adapted to keep fire out or to allow fire in some circumstances. What sort of questions will you ask? What kind of data will you collect from where? [**10 marks**]

Question 4: One of the key barriers to evidence-based decision-making in NRM is the difficulty that natural resource managers face in evaluating and interpreting findings from the scientific literature, which is often published in inaccessible places and use highly technical language. Acknowledging that both managers and researchers face time and resource constraints in their daily tasks, discuss possible solutions to this PROBLEM. [**4 marks**]

Question 5: Evaluate the relationship between the concepts of metapopulations and patch dynamics. [**4 marks**]

Question 6: Explain the difference between equilibrium and non-equilibrium dynamics as applied in rangeland management. [**4 marks**]

Question 7: Hierarchical patch dynamics is a simple expansion of patch dynamics that recognises that disturbances can be nested, and that they interact with other different disturbances at a variety of scales, creating a hierarchy of natural disturbances and patch characteristics. Explain why and how this is a key constraint for an initiative to approach natural resource management as a patch dynamics problem. [**4 marks**]

Question 8: Essay Question: The pastoralist farmers of Namibia's arid northwest region have for centuries followed the traditional practice of moving their livestock to areas that had received rain, sometimes over long distances, leaving the old range behind. It has been argued that in this case, vegetation composition and structure is not affected by animal stocking rate because plants and animals are both affected by random abiotic factors such as the highly variable rainfall. Rangelands that appear to be degraded therefore experience frequent rest periods when animals migrate away or die out and can recover their diversity and composition soon after rain. More importantly, the argument also states that the concept of stocking rate therefore does not apply at all.

Discuss both sides of this argument – is there evidence for the hypothesis that livestock do not affect vegetation structure? If so, what kind of evidence is there? On the other hand, is there evidence for large scale degradation? What is this evidence? What is the reason for this dichotomous view? [**20 marks**]

Question 9: Diagram Question: It has been said that fire's effects on savannas is just like that of a very large, very hot herbivore. And in many respects fire's effect on savanna structure and function is indeed similar that of a large herbivore, but in many others it is not. Using the extra supplied paper, explain the similarities and differences in an annotated graphic that shows relationships between the main elements that make up this contrast, and that shows how they compare in terms of their effects on vegetation physiognomy and nutrient cycling. [**20 marks**]

QUESTION 9 DIAGRAM ANSWER PAGE WRITE YOUR NAME HERE_____