



**NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY**

FACULTY OF NATURAL RESOURCES AND SPATIAL SCIENCES

DEPARTMENT OF AGRICULTURE AND NATURAL RESOURCES SCIENCES

QUALIFICATION:	BACHELOR OF NATURAL RESOURCES MANAGEMENT (NATURE CONSERVATION)	
QUALIFICATION CODE: 07BNTC		LEVEL: 6
COURSE: AQUATIC ECOSYSTEM MANAGEMENT		COURSE CODE: AEM 610S
DATE: JUNE 2019		SESSION:
DURATION: 3 HOURS		MARKS: 125

FIRST OPPORTUNITY EXAMINATION QUESTION PAPER

EXAMINER: Ms. S. Bethune
MODERATOR: Ms. N. Nashipili

INSTRUCTIONS

1. Write clearly and neatly
2. Answer all questions
3. Number the answers correctly

PERMISSIBLE MATERIALS

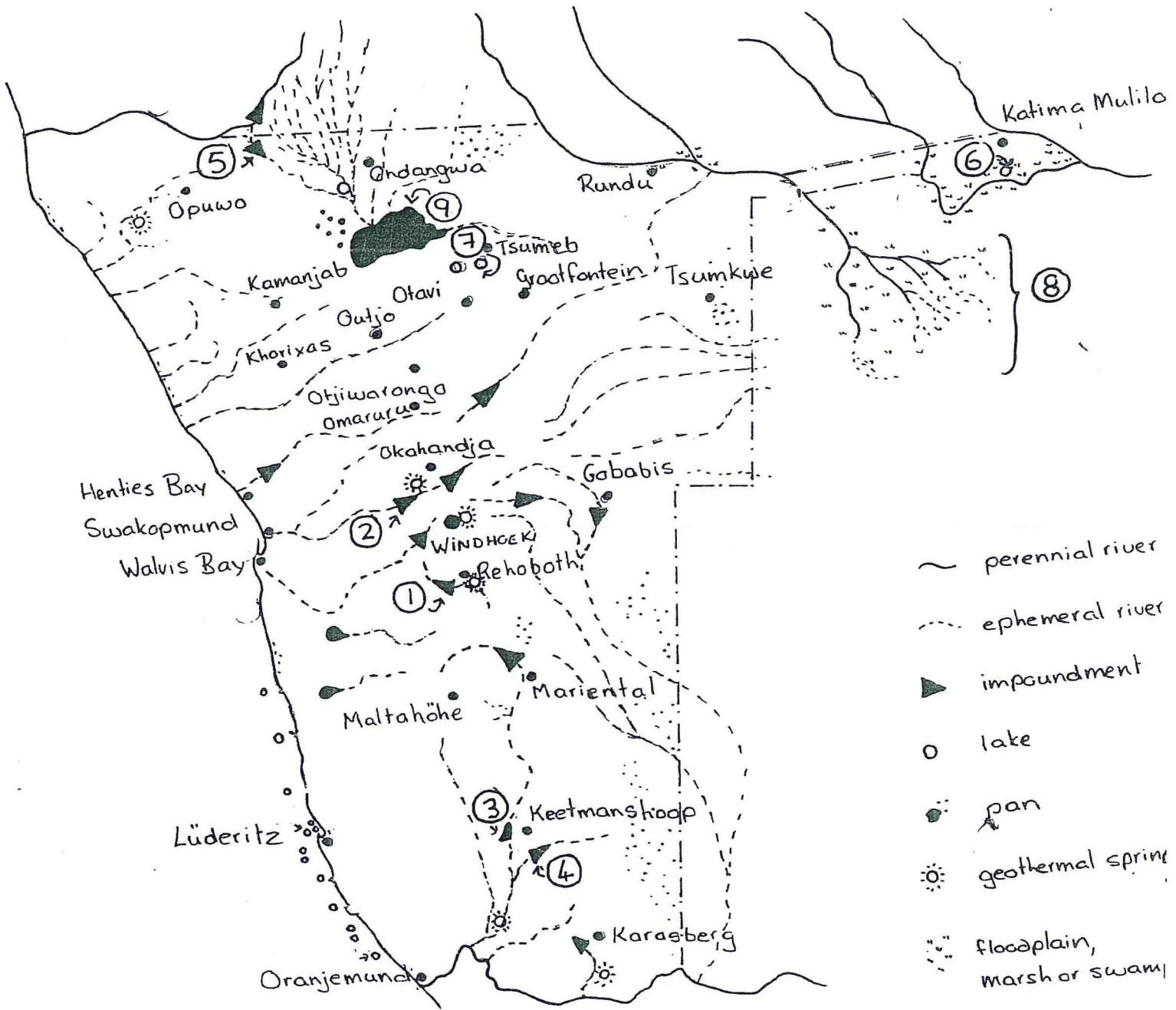
1. Examination Paper
2. Examination Script
3. The Criteria for Identifying Wetlands of International Importance
4. The Newspaper report "Climate change remains a global problem – Libanda"

This paper consists of five (5) pages, including this front page.
As well as Ramsar Criteria (1p), and the Newspaper article (1p).

QUESTION 1 WETLAND MAP AND TERMINOLOGY

1.1 Study the map below:

- a) Name the impoundments numbered, 1 – 5 and the river each is on. (10)
- b) Name the lakes numbered, 6 and 7. (2)
- c) Name the Ramsar Sites numbered, 8 and 9. (2)



- 1.2 Give the correct term for **and** a Namibian example of:
- a) A river that does not reach the sea. (2)
 - b) A groundwater source that is no longer recharged. (2)
 - c) A resting phase during the life-cycle of aquatic animals to survive the hot, dry times. (2)
- [20]**

QUESTION 2 RAMSAR

- 2.1 What is this year's theme for World Wetlands Day. (1)
- 2.2 Read the attached newspaper article by Benedict Libanda, CEO of the Environmental Investment Fund, that was published in *The Namibian* after the World Wetlands Day commemoration that you attended at Oanob Dam. Answer the following questions:
- a) Why is Namibia particularly vulnerable to climate change? (2)
 - b) How will, even a temperature increase of 1.5°C, affect agriculture in Namibia? (1)
 - c) Based on what you learnt in class how many severely hot days did Gobabeb experience 50 years ago and how many did they have in 2018? (2)
 - d) How can we “improve the resilience” of our wetlands to better cope with likely future changes? (1)
- [7]**

QUESTION 3 COASTAL WETLANDS

- 3.1 a) Write a paragraph to describe the typical conditions found on Namibia’s offshore islands. (3)
- b) Write a paragraph on the Namibian Islands MPA giving, its size and locality, as well as, its importance to sea birds, explain what an IBA is and name two of the islands that are IBAs. (7)
- 3.2 The shared Ramsar site at the Orange River Mouth is listed in the Mountreux Record. Explain what this means **and** reasons why it is on this record. (5)
- [15]**

QUESTION 4 PERENNIAL RIVERS

- 4.1 There is world-wide concern that activities upstream in Angola and Namibia can threaten the integrity or health of the Okavango Delta in Botswana. Briefly discuss **one, current major** activity in **each** the Angolan and Namibian sections of the Okavango River Basin that is likely to reduce flow into the Okavango Delta. Conclude with the main impacts that reduced water flows will have on the Delta. (4)
- 4.2 Due to seepage from the dam, some sections of the Fish River, below the dam are perennial. The Biology teacher at Mariental High School is worried that agricultural runoff from the irrigation plots might be polluting the river. (14)

Please recommend a suitable bio-monitoring method and say why it is suitable. Carefully explain how it works, and what equipment you need. Explain how his learners should do this bio-monitoring method in the field, **and** how they can use the results to determine if the Fish River section between the dam and Mariental is healthy. [18]

QUESTION 5 SEASONAL RIVERS

- 5.1 The middle or lishana section of the Cuvelai System is largely unprotected and yet it is important as the main water supply to the Etosha Pan Ramsar Site. Use the attached Ramsar Criteria to prepare a **table**, to explain **five** Ramsar criteria it meets and to motivate how it meets each. (10)
- 5.2 Briefly describe the inter-basin transfer scheme that supplies water to the north-central part of Namibia and discuss the main conservation concerns related to it. (4)

[14]

QUESTION 6 EPHEMERAL RIVERS

- 6.1 One important function of our ephemeral rivers is their function as biological corridors:
- a) Explain what a biological corridor is and give the scientific names of **two** large mammal species that use ephemeral riverbeds as biological corridors in North-western Namibia. (3)
- b) As a the Nature Conservator working in the Palmwag Concession area in North-western Namibia you are concerned about the vehicles using the Hoanib riverbed as a road to get to the lodge. Briefly **discuss two** conservation concerns that you want to raise about the vulnerability of the wildlife that use this river as a biological corridor at the next meeting of the conservancies in the north-western Namibia. (4)
- 6.2 On your excursion you visited the Upper Fish River Basin:
- a) Name the large dam that you visited, **and** briefly discuss **four** impacts that this dam has on the Fish River downstream. (5)
- b) Name **three** activities in the Upper Fish River Basin that are major users of water in that section of the Orange-Fish River Basin. (3)

[15]

QUESTION 7 LACUSTRINE WETLANDS

- 7.1 Based on your visit to Swakoppoort Dam in May and what you learnt in class:
- a) Briefly explain what stratification is, (2)
- b) Explain how this breaks down **in Autumn**, (1)
- c) Say why this can cause water quality problems at the Von Bach Water Purification Plant. (2)
- 7.2 As you saw on your visit to Etosha, in most years the Efundja often does not reach the Etosha Pan, yet it is important to the wildlife in the park. Discuss **three** reasons why the efundja essential. (3)

- 7.3 Briefly discuss the **two** endemic fish species found in the Karstveld sinkholes and a cave. (8)
Give the scientific and common names of each fish species, their conservation status, where each of them is found and the **main threat** faced by each. [16]

QUESTION 8 PALUSTRINE WETLANDS

- a) Give the scientific and common name of the Namibian fish species that can survive (2)
when its rainwater pool dries out. (7)
- b) Sketch and label its life-cycle (9)

QUESTION 9 AQUACULTURE

Based on what you saw at the Eco- Fish Farm at Hardap Dam design an **intensive, open production**, aquaculture venture to set up at Goreangab Dam in Windhoek:

- a) Describe or sketch the layout of your fish farm. (3)
- b) Say why an intensive, open production system would be suitable. (2)
- c) Give the scientific names of **two**, indigenous fish species you would choose for your fish farm and the reason why these two species would be ecologically suitable for Goreangab Dam. (3)
- d) Give the main economic, technical **and** ecological disadvantages of this production system. (3)

TOTAL – 125



The Criteria for Identifying Wetlands of International Importance

Group A. Sites containing representative, rare or unique wetland types

Criterion 1: A wetland should be considered internationally important if it contains a representative, rare, or unique example of a natural or near-natural wetland type found within the appropriate biogeographic region.

Group B. Sites of international importance for conserving biological diversity

Criteria based on species and ecological communities

Criterion 2: A wetland should be considered internationally important if it supports vulnerable, endangered, or critically endangered species or threatened ecological communities.

Criterion 3: A wetland should be considered internationally important if it supports populations of plant and/or animal species important for maintaining the biological diversity of a particular biogeographic region.

Criterion 4: A wetland should be considered internationally important if it supports plant and/or animal species at a critical stage in their life cycles, or provides refuge during adverse conditions.

Specific criteria based on waterbirds

Criterion 5: A wetland should be considered internationally important if it regularly supports 20,000 or more waterbirds.

Criterion 6: A wetland should be considered internationally important if it regularly supports 1% of the individuals in a population of one species or subspecies of waterbird.

Specific criteria based on fish

Criterion 7: A wetland should be considered internationally important if it supports a significant proportion of indigenous fish subspecies, species or families, life-history stages, species interactions and/or populations that are representative of wetland benefits and/or values and thereby contributes to global biological diversity.

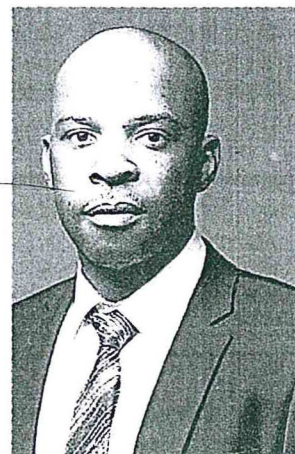
Criterion 8: A wetland should be considered internationally important if it is an important source of food for fishes, spawning ground, nursery and/or migration path on which fish stocks, either within the wetland or elsewhere, depend.

Specific criteria based on other taxa

Criterion 9: A wetland should be considered internationally important if it regularly supports 1% of the individuals in a population of one species or subspecies of wetland-dependent non-avian animal species.

Climate change remains a global problem – Libanda

CLIMATE change remains a global problem as countries and communities everywhere are facing pressures that are being exacerbated by mega trends such as prolonged droughts, food insecurity, water scarcity and wild fires, the Environmental Investment Fund (EIF)'s chief executive officer, Benedict Libanda, says.



Benedict Libanda

Speaking at world wetlands day, international day of forests, and world water day commemoration at the Oanob Dam, Rehoboth, on Friday, Libanda said the pressure is especially acute on people living in the drylands because of the marginal and fragile nature of the resources.

Namibia as an arid and hyper-arid country is the most vulnerable in sub-Saharan Africa.

"This vulnerability is already being felt with prolonged droughts and erratic rainfall patterns. This is because Namibia is already stressed, and on the brink of running out of water as we continue to battle the worst drought," Libanda remarked.

He said projections of the special report which was launched by the Intergovernmental Panel on Climate Change in October 2018 illustrates that at an increase of 1,5 degrees Celsius, the impact of climate change on Namibia will be greater than the global average.

He pointed out some of the impacts of global warming at 1,5 degrees Celsius, and said in relation to Namibia, the annual rainfall will reduce by 4%, while the evaporation rate will increase by 10%. The cereal and livestock production rate will reduce with 10%, while the number of severely hot days will increase to 21 per annum, with the impacts at a worst-case scenario projected at 3 degrees Celsius, a result that will be devastating for Namibia.

"We note that current adaptation actions are not sufficient, and there are many measures that could be applied in localised areas. We, therefore, need to maintain the balance in our production and consumption systems, and there is a need for new knowledge, access to finance, alternative policies and institutional changes," Libanda said.

He added that life without water is unimaginable, and the EIF does not wish to give such a dangerous way of life to the future generations.

"In view of these challenging issues, the EIF will continue to devise innovative mechanisms to deal with climate change. With the assistance from the Green Climate Fund, this year we will be investing more than N\$200 million directly in marginalised communities within drylands to improve resilience and adaptive capacity," he said.

Libanda added that the time to act is now, and EIF is committed to ensure that the economy, livelihoods and essential eco-systems are 'climate-proof'. – *Nampa*