



**PAMIBIA UNIVERSITY  
OF SCIENCE AND TECHNOLOGY**

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

**DEPARTMENT OF NATURAL RESOURCE SCIENCES**

<b>QUALIFICATION: BACHELOR of NATURAL RESOURCE MANAGEMENT (NRM)</b>	
<b>QUALIFICATION CODE: 07BNRS</b>	<b>LEVEL: 7</b>
<b>COURSE CODE: WWR711S</b>	<b>COURSE NAME: WATER AND WETLAND RESOURCES MANAGEMENT</b>
<b>SESSION: JULY 2025</b>	<b>PAPER: THEORY</b>
<b>DURATION: 2.5 HOURS</b>	<b>MARKS: 120</b>

<b>SECOND OPPORTUNITY EXAMINATION QUESTION PAPER</b>	
<b>EXAMINER(S)</b>	Mrs. C NTESA
<b>MODERATOR:</b>	Mrs. N NASHIPILI

<b>INSTRUCTIONS</b>
<ol style="list-style-type: none"><li>1. Answer ALL the questions.</li><li>2. Read all the questions carefully before answering.</li><li>3. Number the answers clearly</li><li>4. Make sure your name and surname, question number and the date appear on the answer script.</li><li>5. Please ensure that your writing is legible, neat and presentable.</li></ol>

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

### QUESTION 1

*Write short notes to define or explain the following:*

- 1.1. Benguela Current (1)
- 1.2. Guano platform (1)
- 1.3. Seasonal Rivers (lishana): (1)
- 1.4. Floodplains (1)
- 1.5. Tributary (1)
- 1.6. Mountreux Record (1)
- 1.7. Alluvial Aquifer (1)
- 1.8. Catchment (1)
- 1.9. Linear oasis (2)

[10]

### QUESTION 2

*Give a correct word/term for the following:*

- 2.1. An inland Ramsar site in North-Central Namibia. (1)
- 2.2. The type of sinkhole lake where the total surface area is open to the air e.g. Lake Otjikoto and Lake Guinas. (1)
- 2.3. The weathering of limestone by water. (1)
- 2.4. An IUCN Conservation Status that refers to a species with at least a 20% chance of going extinct in 20 years. (1)
- 2.5. The artificial lake behind the dam wall or a reservoir that stores the water. (1)
- 2.6. A term that refers to bird species that breed in the Palearctic region (Europe, North Africa, and northern Asia) and migrate to warmer regions during the non-breeding season. (1)
- 2.7. A river whose flow originates outside the region it flows through, especially in drier downstream areas. (1)
- 2.8. The process of a gradual increase in phosphorus and nitrogen in lakes results in an algal bloom. (1)
- 2.9. A term that refers to wetlands with flowing water. (1)
- 2.10. Rivers that flow only after good rain for a few days or weeks or not at all in some years. (1)

[10]

### QUESTION 3

*Discuss* five (5) issues and threats of conservation concern associated with wetlands in Namibia.

[10]

### QUESTION 4

- 4.1. The Ramsar Convention is an international treaty established in 1971 for the conservation and sustainable use of wetlands. It provides a framework for (9)

national action and international cooperation to protect these vital ecosystems. **Describe** the Ramsar Convention in terms of its aims, key functions and responsibilities. Additionally, **list** any four Ramsar sites in Namibia .

4.2. **What** is the World Wetland Theme for this year, 2025? (1)

[10]

#### QUESTION 5

5.1. **What** percentage of the World's oceans are upwelling areas, and **what** percentage of the world's fishery production relies on upwelling? (2)

5.2. **What** is an estuarine wetland and **name** the one in North-western Namibia? (2)

5.3. Sulphur eruptions occur when hydrogen sulfide gas is released from the ocean floor, often as a result of decaying organic matter in oxygen-poor environments. Along the Atlantic Coast of Namibia, these eruptions are particularly common due to the region's strong upwelling and high biological productivity. **Discuss** the environmental and economic impacts of sulphur eruptions, specifically in relation to the Atlantic Ocean off the coast of Namibia. (6)

[10]

#### QUESTION 6

6.1. The Orange River is a major perennial river forming part of the southern border of Namibia and plays a vital role in the region's hydrology, ecology, and international water management. **Answer** the following questions related to this river system:

6.1.1. **Provide** the abbreviation and full name of the River Basin Commission responsible for the international management of the Orange-Senqu River. Additionally, **list** the countries that share this river basin. (3) ½ a mark for each country

6.1.2. **Identify** the Ramsar site associated with the Orange River system. **Explain** why this site has been placed on the Montreux Record, giving five (5) specific reasons. (6)

6.1.3. **Discuss** how and why the natural summer and winter flow patterns of the Orange River have been modified and the impacts of the flow modification on the Estuary. (5)

[14]

#### QUESTION 7

**Compare** and **contrast** the Upper, Middle, and Lower catchments of Namibia's westward-

flowing ephemeral rivers in terms of their location, rainfall patterns, flow direction, land use and water sources. In your answer, **describe** the key physical and human characteristics of each catchment.

[15]

#### QUESTION 8

8.1. During summer, water in dams becomes stratified, forming distinct layers based on temperature and density. This separation affects oxygen and nutrient distribution throughout the water column. **Describe** two natural processes that can lead to the breakdown of this stratification. (15)

8.2. **Name** the endemic fish species found only in Aigamas Cave in the Otavi mountains. (1)

[16]

#### QUESTION 9

**Describe how** sedimentation and turbidity impact dam ecosystems in terms of aquatic life, water quality, and the long-term functionality of the dam?

[7]

#### QUESTION 10

10.1. **Define** Integrated Water Resources Management (IWRM) in your own words. (2)

10.2. To implement the IWRM concept, Namibia introduced a Basin Management Approach (BMA) in 2001, aimed at establishing Basin Management Committees (BMCS) in each of its basins. **What** are the main functions of a River Basin Management Committee in Namibia? (6)

10.3. All of Namibia's perennial rivers are found at the borders, and to ensure cooperation, several transboundary river basin management institutions have been established between Namibia and the respective basin states in each shared river basin.

10.3.1. **Give** the full name and abbreviation of the transboundary river basin management institution/commission responsible for the international management of the Okavango River and name the countries that share it. (2)  $\frac{1}{2}$  a mark each

10.3.2. **Name** two Ramsar sites that are associated with the Okavango River System. (2)

10.3.3. **Explain** the joint cooperation activities that are carried out under the transboundary river basin management institution/commission for the Okavango River to maximise the benefits that can be obtained by utilising the resources of the basin on a sustainable basis. (6)

[18]