



**NAMIBIA UNIVERSITY  
OF SCIENCE AND TECHNOLOGY**

**FACULTY OF HEALTH, NATURAL RESOURCES AND APPLIED SCIENCES  
SCHOOL OF AGRICULTURE AND NATURAL RESOURCE SCIENCES  
DEPARTMENT OF NATURAL RESOURCE SCIENCES**

<b>QUALIFICATION: BACHELOR OF NATURAL RESOURCES MANAGEMENT HONOURS</b>	
<b>QUALIFICATION CODE: 08BNRMH</b>	<b>LEVEL: 8</b>
<b>COURSE CODE: IWW821S</b>	<b>COURSE NAME: INTEGRATED WATER AND WETLAND MANAGEMENT</b>
<b>DATE: JULY 2023</b>	
<b>DURATION: 3 HOURS</b>	<b>MARKS: 120</b>

<b>SECOND OPPORTUNITY EXAMINATION QUESTION PAPER</b>	
<b>EXAMINER(S)</b>	Ms. S. Bethune
<b>MODERATOR:</b>	Ms. N. Nashipili

<b>INSTRUCTIONS</b>
1. There is no need to follow this marking scheme rigorously.

**THIS MEMORANDUM CONSISTS OF 7 PAGES**  
(Including this front page)

**QUESTION 1. WATER AND WETLANDS AWARENESS**

- 1.1 You have been invited to give a presentation to Grade 9 learners from Walvis Bay High School on the Kuiseb River as a linear oasis and as a water supply source. Based on what you know and experienced on your excursion to the lower Kuiseb River Basin, prepare a suitable, **7 slide presentation**. Emphasize the ecological and the economic value of the lower Kuiseb River to the wildlife and people that live alongside it, as well as to the town of Walvis Bay. Explain who is responsible for water supply from the Kuiseb River give **three** challenges to that the water suppliers face. End by inviting the learners to join you on a visit to the NamWater boreholes, the High Dune Reservoir and to the Gobabeb Namib Research Institute as you want to further explain and demonstrate the value of this linear oasis and the challenges of water supply. Your last slide must show a **map** of the route you will take for your one-day excursion. (14)
- 1.2 Write a short newspaper article for the *Namib Times* to tell readers about the link between unconventional water sources, and the limited water supplies from conventional water sources, at the coast. Explain how this could be the solution to managing water supply in the arid, central coastal region. Base your article on your visit to the Erongo Desalination Plant and your interviews with NamWater officials during your coastal excursion. Give your article a catchy title, describe the photograph you will use and provide a suitable caption. (10)
- [24]

**QUESTION 2. WATER AND WETLANDS CONSERVATION - RAMSAR**

- 2.1 Choose **either**: **A. The Bwabwata Okavango Ramsar Site,**  
**or B. The Walvis Bay Wetlands Ramsar Site** (10)  
Use the attached Ramsar Criteria for wetlands of international importance to draw a table to briefly **sum up 5** criteria it meets and to clearly motivate why.
- 2.2 What is this year's theme for World Wetlands Day. Describe the three activities you did with learners from Groot Aub during the visit to Avis Dam, clearly link each activity to either, this year's theme, or the value of a heathy wetland. Finally add which one of your activities was not really suited to the wetland type at Avis Dam and why. (8)

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**QUESTION 3. BIOMONITORING**

- 3.1 What does SASS stand for? **and** clearly explain why we use aquatic invertebrates to determine river health. (3)
- 3.2 The geography teacher at Rundu High School wants her Grade 12 learners to compare the health of the Okavango River upstream and downstream of Rundu Beach because she is worried about pollution from people swimming and washing their cars in the river. She has asked you as the OkBMC Basin Officer to tell her about a simple method she can use to monitor the quality of the water. Write to tell her about Mini SASS, how it works, and what equipment she will need. Explain why the method is suitable for learners to use. Explain what data sheets and identification guides are available. Offer to assist her the first time and suggest how often they should sample. (6)
- 3.3 Draw a table to compare **three** differences between SASS 4 and Mini-SASS 2. (3)

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#### QUESTION 4. NATIONAL-LEVEL WATER RESOURCES MANAGEMENT

The Water Resources Management Act 11 of 2013 advocates River Basin Management as the most appropriate way to manage our water resources in Namibia. The central Namib Water Region falls under two different River Basin Management Committees

- 4.1 Name and give the correct abbreviation for the two River Basin Management Committees active in the Namib Water Region. (4)
- 4.2 Based on the guest presentation by Mr. Ignatius Sikongo, Basin Support Officer for the Kuiseb Basin, list **six** responsibilities of National River Basin Management Committees, as mandated by the Water Resources Management Act 11 of 2013. (6)
- 4.3 Based on your visit to the Omdel scheme and the lecture on water supply from ephemeral rivers and the Omdel scheme as a case study, draw a simple sketch to show the layout of the scheme. Add short labels and arrows to explain the process. (6)
- 4.4 Based your excursion to the coast this year, discuss **three** Water Demand Management methods we use in Namibia that other countries in the world can adopt to help them to use water more efficiently to better cope with decreasing water availability due to climate change and increasing water demands. (6)

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#### QUESTION 5. INTERNATIONAL-LEVEL RIVER BASIN MANAGEMENT

In 2010, OKACOM, commissioned an Environmental Flows Assessment in all three countries that share the Okavango River Basin. This research was led by Dr Jackie King, who won the Stockholm Water Prize for her studies on Environmental flows, as an aid to river basin planning. Based on what you have read and learnt about this study answer the following questions.

- 5.1 Give the full name of OKACOM and name the two countries that share this basin with Namibia. (3)
- 5.2 Sketch a typical hydrograph, for the Okavango River at Rundu to show the four stages for the flood-pulsed Okavango River. (6)
- 5.3 Briefly outline the process that was followed to assess future impacts on environmental flows throughout the basin, (6)
- 5.4 Use the attached handout of the main findings of the OKACOM EFA to interpret the total livelihoods graph for each of the three scenarios, Low, Medium and High. Link this to the three pillars of sustainable development: social equity, environmental health, and economic wealth, to explain which pillar of sustainability will be most clearly affected and why. (5)

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#### QUESTION 6. INTEGRATED WATER RESOURCES MANAGEMENT

- 6.1 IWRM is based on the principles agreed on at the International Conference on Water and the Environment held in Dublin, Ireland in January 1992. List **four** of the Dublin Principles **and** give an example of how each is met in the water management in any Namibian river basin of your choice. (8)

6.2 Write a short essay on IWRM in the Namibian river basin that you prepared a poster on. (16)

Give a brief introduction to describe your river basin, giving its locality, the mean annual rainfall, when it rains, important wetlands and aquifers in the basin and the main human activities dependent on water supplies in the basin.

Then choose **two** of the points below and write a paragraph on each to show these IWRM links within your basin:

- The inter-relationship of upstream and downstream sections of the basin
- The joint use of both surface and groundwater sources
- Co-operation and sharing between different water suppliers and users.
- Water conservation to ensure enough water for both the Environment and people.

Finally conclude with what you see as the main advantage of IWRM to Namibia and motivate your answer.

**TOTAL - 120**

**[24]**