



NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

FACULTY OF HEALTH, APPLIED SCIENCE AND NATURAL RESOURCES

DEPARTMENT AGRICULTURE AND NATURAL RESOURCES SCIENCES

QUALIFICATION : Bachelor Of Natural Resource Management Honours	
QUALIFICATION CODE: 08BNRMH	LEVEL: 8
COURSE CODE: IWW821S	COURSE: Integrated Water and Wetland Management
DATE: July 2022	SESSION: July
DURATION: 3 HOURS	MARKS: 120

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

<p style="text-align: center;">INSTRUCTIONS</p> <ol style="list-style-type: none">1. Answer ALL 5 questions, note choices2. Write clearly and neatly3. Number your answers correctly.4. Make sure your student number appears on the answering script.
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PERMISSIBLE MATERIALS

1. Examination paper.
2. Examination script.
3. Criteria for Identification of Wetlands of International Importance

THIS QUESTION PAPER CONSISTS OF 3 PAGES (Excluding this front page)

QUESTION 1. WATER AND WETLAND AWARENESS

- 1.1 You have been invited to give an interactive presentation to Grade 8 and 9 learners, who are participating in the National Water Week, to make them more aware of the future impact of climate change on the water situation in Windhoek. Prepare **7 slides** to show them where the city gets its water from, the water challenges the city will face as our climate gets hotter and drier in future years, and what the learners themselves can do to prepare for this. Show your headings, the main text, illustrations that you will use and make sure that it is interactive. (14)
- 1.2 Based on your experience speaking to learners about water awareness say how you can ensure that your presentation is correctly targeted and interesting to your audience. (2)
- 1.3 Based on your participation in the National Water Week and your excursion to the coast this year, discuss **four** lessons Namibia can teach the world about using water more efficiently to better cope with the decreasing water availability due to climate change and increasing water demands. (8)

[24]

QUESTION 2. WATER AND WETLANDS CONSERVATION - RAMSAR

- 2.1 Choose **either**: **A. The lishana** section of the Cuvelai Basin, **or B. The Karst wetlands** that include both the sinkholes and lakes. Use the attached Criteria for identifying wetlands of international importance to write an **essay** motivating how the site you choose meets **four** of the Ramsar Criteria. (11)
- 2.2 Based on your excursion to the coast, prepare a short newspaper article for "*The Namibian*" on wetland-based tourism. Consider the value of the Walvis Bay Wetlands Ramsar Site to Tourism, threats by tourists and residents. Add why we should conserve this Ramsar Site and the rich diversity of seabirds it supports giving examples of the birds found there and the role of the wetland to migratory birds. Provide a catchy title. Describe photograph to illustrate your article and give a caption. (9)

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QUESTION 3. NATIONAL-LEVEL WATER RESOURCES MANAGEMENT

- 3.1 Based on what you learnt on your excursion to the coast, write an **essay** on water supply to the Central Namib water region from the alluvial aquifers in the Kuiseb and Omaruru rivers **and** the challenges NamWater faces when trying to ensure an adequate, good quality water supply to the users in such an arid, yet rapidly developing, region. Be sure to give accurate facts and figures. Also explain how the water suppliers make use of unconventional water sources to meet the growing demand, discuss the challenges related to these **and** give the reasons for the increase in water demand. Conclude by suggesting effective WDM strategies, that the municipalities of the coastal towns and the mines should consider implementing. (16)

- 3.2 Explain what is meant by Water Demand Management **and** why this it is important to implement Water Demand Management in Namibia. Motivate with clear examples. (4)
- 3.3 Based on your interview with Mr. Ignatius Sikongo, the Basin Support Officer of the Kuiseb Basin Management Committee during your excursion, list **four** main challenges that the present KBMC committee faces. (4)

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QUESTION 4. INTERNATIONAL-LEVEL WATER RESOURCES MANAGEMENT

Internationally river basin management is the responsibility of River Basin Management Commissions like the Permanent Okavango River Basin Commission, OKACOM. Use what you have learnt about the Environmental Flows Assessment of the Okavango River, based on the OKACOM study led by Dr Jackie King, a recent winner of the Stockholm Water Prize for her work worldwide, in the following questions.

- 4.1 Sketch a typical hydrograph, for the Okavango River at Rundu to show the four stages for the flood-pulsed Okavango River. (6)
- 4.2 Explain how the different levels of water use scenarios for the Environmental Flows Assessment on the Okavango River Basin were decided. (3)
- 4.3 Discuss the main social impact that was identified by the Environmental Flows Assessment of the Okavango River Basin. Quantify the losses in US\$, identified for each of the three water use scenarios, the Ministers selected. (5)

[14]

QUESTION 5. WATER AND WETLAND RESOURCES MANAGEMENT, CONSERVATION AND CHALLENGES IN DIFFERENT NATIONAL RIVER BASINS OR WATER SUPPLY REGIONS

Prepare a **short 5-paragraph essay** to discuss the water and wetland resources, the main water users in the basin, their management, and the challenges faced in a selected National River Basin or Water Supply Region. Choose **either**: (16)

A. The Central Namib Water Supply Region that we visited on our excursion
OR

B. The National River Basin that **you** prepared your poster on
In your introduction, include, the location, the rainfall and typical vegetation of the basin. Then write the next 3 paragraphs, one each on: water and wetland resources in the basin; the main users of water in the basin - list them from those that use the most water to those using the least; management of the basin at each appropriate level. Finally add a paragraph to discuss the main challenges of waters supply and protection of the water sources within the basin you have chosen. Conclude by recommending how the water supply in the basin can be safeguarded from climate change risks.

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QUESTION 6. INTEGRATED WATER RESOURCES MANAGEMENT (IWRM)

5.1 Integrated Water Resources Management includes linking **ground and surface water** supplies as well as linking **conventional and unconventional** water supplies. Describe the Omdel Dam and groundwater scheme within the overall context of the central coastal water supply scheme, that you visited on your coastal excursion to show how these links are used to overcome the challenge of water supply in the desert. (10)

5.2 Some of the other water issues that should be integrated to ensure successful implementation of Integrated Water Resources Management, IWRM are: (12)

- Upstream and downstream interactions,
- Different water users and uses within a basin and their competing needs,
- Involvement of all stakeholders in participatory basin management.

Write an **essay** to discuss any **two** of these aspects of Integrated Water Resources Management on IWRM in Namibia based on **either**:

A. The Kuiseb River Basin,

OR

B. The Omaruru Basin.

Introduce the **IWRM** concept, linking IWRM to the water situation in Namibia. Then choose **two** of the issues above and clearly relate each either to the Kuiseb or the Omaruru river basins. Conclude with **two** main advantages of IWRM to Namibia.

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TOTAL - 120



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.