UNIVERSITY OF JOHANNESBURG

FACULTY OF SCIENCE

DEPARTMENT OF GEOGRAPHY, ENVIRONMENTAL MANAGEMENT & ENERGY STUDIES

MODULE ENM2A10
ENVIRONMENTAL MANAGEMENT

CAMPUS APK

EXAM 2019

DATE 31 MAY 2019 **SESSION 8:30**

ASSESSOR(S) **DR KY YESSOUFOU**
MRS L.S MODLEY

EXTERNAL MODERATOR

DURATION 3 HOURS **MARKS 100**

NUMBER OF PAGES: 3 PAGES

INSTRUCTIONS:

1. Answer each section in a separate answer book

2. Answer 4 questions, 2 questions from each section. Note: there are choices in both Sections 1 and 2

3. Number your answers carefully and use the numbers that are used in the question paper.

SECTION 1: MRS L.S. MODLEY

PLEASE ANSWER ALL THREE QUESTIONS:

QUESTION 1.1. CLIMATE CHANGE

Climate change is no longer some far off problem, it is happening here; it's happening now. - Barack Obama

Provide a brief background on Climate Change and give one natural disaster which was a direct consequence of climate change in South Africa. In your answer you should include the impacts that this particular natural disaster had.

(15)

- Not a new phenomenon
- Over the past 3.5 billion years the planets climate has been altered many times by several factors:
    - Volcanic emissions
    - Changes in solar input
    - The shifting of tectonic plates
    - Impacts by meteors and asteroids
    - Global circulation patterns
    - Large areas of ice
    - Varying concentrations of different gases that make up the atmosphere
    - Occasional slight changes in ocean currents
- The natural greenhouse effect
    - Climate is strongly influenced by changes in the amount of solar radiation reaching the earth (Greenhouse effect).
    - Solar energy absorbed radiates as infrared radiation.
    - 1% of the earths lower atmosphere is composed of greenhouse gases:
        - Water vapour
        - Carbon Dioxide
        - Methane
        - Nitrous oxide
    - The last 3 play varying roles in atmospheric warming because of their varying lifetimes.
- Carbon dioxide emissions:
    - Burning of fossil fuel
- Methane emissions:
    - Livestock production
    - Rice production
    - Natural gas production
    - Leaky coal mines
    - Landfills
    - Flooding of land behind large dams
    - Nitrogen oxide emissions:
    - Nitrogen fertilizers
- Rapid atmospheric warming could have serious consequences
    - Floods in low-lying coastal cities
    - Forests being consumed in vast wildfires
    - Grasslands turning into dustbowls
    - Rivers drying up
    - Ecosystems collapsing
    - The extinction of up to half of the worlds species
    - More intense and longer lasting heatwaves
    - More destructive storms and flooding

- More rapid spread of some infectious tropical diseases

QUESTION 1.2 NON-RENEWABLE RESOURCES

You have been employed as an Environmental Consultant at one of South Africa's new mines. The developer would like to know how to distinguish between open cast and open pit mining. In addition to this; they would also require a brief explanation on how to minimize and manage the impacts that mining will have on the environment. (15)

- **Open-pit mining** refers to a method of extracting rock or minerals from the earth by their removal from an open pit. Open pit mines are used when deposits of commercially useful minerals or rock are found near the surface; ie, where the overburden is relatively thin.
- Open-pit mines are typically enlarged until the mineral resource is exhausted or the extraction becomes uneconomic.
- Types of rock extracted from open pits include:
- Copper ore
- Coal
- Bauxite (Aluminium)
- Gold ore
- Lead/zinc/silver
- Nickel
- Iron ore
- Diamonds
- After mining finishes, the mine area must undergo final rehabilitation.
- Waste dumps are contoured to flatten them out, to further stabilise them, and covered with soil, and vegetation is planted to help consolidate the material.
- If the ore contains sulphides dumps are usually covered with a layer of clay to prevent oxidisation (acid mine drainage).
- The open pit is then surrounded with a fence, to prevent access, and it generally eventually fills up with ground water.
- **Opencast, or strip, mining** is the practice of mining a seam of mineral ore by first removing all of the soil and rock that lies on top of it (the overburden). It is similar to open-pit mining in many regards.
- Strip mining is only practical when the ore body to be excavated is relatively near the surface. Since colossal quantities of material often need to be removed, the excavating machinery used in strip mining is often among the largest such equipment ever constructed; drag lines and bucket-wheel excavators are common examples.
- Types of rock extracted from opencast mines include:
- Coal
- Oil (tar) sands
- Lignite
- Heavy Minerals
- Iron ore
- Phosphates
- Environmental Impact (Closure)
- Generally areas previously mined backfilled
- Usually a small depression remains
- Rehabilitated during mining operations
- Impact on the water table controlled
- Acid mine drainage/decant to control
- Rehabilitation of dumps, dams
- Spontaneous combustion (specifically related to coal mining)
- Differing impacts with different minerals mined
- After mining finishes, the mine area must undergo final rehabilitation.
- The final void(s) must be contoured, profiled and covered.

- Waste dumps are contoured to flatten them out, to further stabilise them, and covered with soil, and vegetation is planted to help consolidate the material.
- If the ore contains sulphides it is usually covered with a layer of clay to prevent oxidisation (acid mine drainage).
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QUESTION 1.3 WATER RESOURCES

Anyone who can solve the problems of water, will be worthy of two noble prizes; one for peace and one for science. – J.F. Kennedy

In your own educated opinion what are the major problems concerning water resources in South Africa. If you could learn any lessons from our neighbouring countries, which tools would you suggest to eradict some of these problems. (20)

- Agriculture
- Reduce erosion
- Reduce the amount of fertilizers
- Plant buffer zones of vegetation
- Use organic farming techniques
- Use pesticides prudently
- Institute tougher pollution regulations for livestock operations
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- How do septic tank systems work?
- Wastewater or sewage treatment plants
- Primary sewage treatment
- Physical process
- Secondary sewage treatment
- Biological process with bacteria
- Tertiary or advance sewage treatment
- Special filtering processes
- Bleaching, chlorination
- Many cities violate federal standards for sewage treatment plants
- Federal law requires primary and secondary treatment
- Exemptions from secondary treatment
- There are health risks of swimming in water with blended sewage wastes
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SECTION 1: Dr K. YESSOUFOU

1- In their paper entitled “An approach to sustainable development: the case of Cuba” that we have discussed in class, Cabello et al. (2012: *Environ Dev Sustain* 14, 573–591) presented the Cuba’s approach to sustainable development in the face of economic embargo. In this paper, we can read the following: "More critical to Cuba’s sustainability status are the choices it has made in the face of the US embargo. The embargo created a closed economic system in which US trade and tourism were restricted and income to the local economy was bound to fall. The challenge this presented, together with the need to wean itself from cheap oil after the

collapse of the Soviet Union in 1991, threatened wholesale economic disruption and political instability. The government of Cuba was forced by its extreme situation to confront the reality of limited resources. It chose the less travelled path of sustainable development for its people. Cuba transformed itself into a more self-reliant, less energy-intensive society without abandoning its longstanding commitment to strong health and educational programs". Cabello et al. (2012) further referred to Cuba as "the only country in the world that meets the conditions of sustainability according to the Worldwide Fund for Nature (WWF)". **[25]**

a. Critically analyse the Cuban model of sustainable development, and tell what environmentalists in South Africa can learn from Cuba's road to sustainability.

b. In the same paper, they also referred very briefly to South Africa's response to economic embargo as follows: "South Africa made, between 1980 and 1991, intensive use of coal to generate electricity with important environmental consequences". What are those environmental consequences?

2- The City of Johannesburg is concerned with the rate at which waste is generated in the City and is actively looking for more sites for landfilling as a waste management approach. You have been approached to provide your expert opinion about landfilling and waste management in general in Johannesburg. Tell us about the advice you will provide. **[25]**

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TOTAL: 100 MARKS