

**UNIVERSITY OF KWAZULU-NATAL, DURBAN CENTRE
EXAMINATION: MAY 2011**

**SCHOOL : ENVIRONMENTAL SCIENCES
LEVEL : III
MODULE : BIOGEOGRAPHY AND CLIMATIC CHANGE
CODE : ENVS314W1**

DURATION: 3 HOURS

TOTAL MARKS: 300

**INTERNAL EXAMINERS: PROF. S. PROCHEs, DR J. FINCH
EXTERNAL EXAMINER: PROF S. GRAB
UNIVERSITY OF WITWATERSRAND**

**INSTRUCTIONS: ANSWER ALL QUESTIONS IN SECTION A. ANSWER ONE
QUESTION FROM SECTION B. ANSWER ONE QUESTION FROM SECTION C.**

SECTION A

ANSWER ALL QUESTIONS (100 MARKS)

1. Explain what quarter-degree squares are, how these units are used in biogeographical research, and discuss their advantages and disadvantages as compared to units of different sizes. (25)
2. Define phylogenetic diversity and explain how it compares with other measures of biodiversity. (25)
3. Outline the techniques that are used to determine the minimum area that should be set aside for conservation. (25)
4. Explain orbital forcing mechanisms and their importance as drivers of climatic instability during the Quaternary Period. (25)

SECTION B

ANSWER ONE QUESTION FROM THIS SECTION (100 MARKS)

5. "It is not the strongest of the species that survive, not the most intelligent, but the one most responsive to change." Charles Darwin (1809-1882). Outline the process of adaptive radiation. Provide examples of successful 'radiation' and impacts of the process of species distribution as well as habitat niche 'filling'.
6. Discuss the process of dispersal in plants and animals, providing examples of the various mechanisms / types, and provide a critique of the dispersal versus vicariance debate.

SECTION C

ANSWER ONE QUESTION FROM THIS SECTION (100 MARKS)

7. Critically respond to the following question: 'Why is conservation of habitat and species important and worth so much effort?' In your response, include the debate regarding species-, biodiversity- and habitat-based approaches to conservation.
8. Explain the paradox of 'Geographic Range Collapse', providing examples where appropriate.

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SUPPLEMENTARY EXAMINATION: JUNE 2011**

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SECTION A

ANSWER ALL QUESTIONS (100 MARKS)

1. Briefly discuss the relationship between the abundance of species and their geographic occupancy, illustrate this relationship using a scatter plot, and tentatively place on this plot a few examples of plant and animal species. (25)
2. So how do we get new species? Critically discuss the models of speciation. Provide examples to substantiate your argument. (25)
3. Describe the different value systems that can be applied to conservation, providing examples where appropriate. (25)
4. Describe the different types of natural archives (deposits or records) that are available for palaeoecological research. (25)

SECTION B

ANSWER ONE QUESTION FROM THIS SECTION (100 MARKS)

5. E.O. Wilson in his 2001 book entitled “The Diversity of Life”, provides a wonderful description of adaptive radiation as: “Once in a while, in a minority of groups, a lucky species hits a new biological trait that allows it to expand and radiate again, reanimating the cycle of dominance on behalf of its phylogenetic kin” (page 86). Discuss the process of adaptive radiation and the impact thereof on island biogeography.
6. Biogeographical regions and provinces were originally delimited intuitively, and only tested analytically later in the development of the discipline. Using regions of your choice as an example, explain the process of analytical regionalization from the definition of the units of analysis and the type of data used, to the calculations involved and the ways in which the results can be interpreted.

SECTION C

ANSWER ONE QUESTION FROM THIS SECTION (100 MARKS)

7. Critically assess the conservation recommendations derived from Island Biogeography theory.
8. Discuss the implications of projected climatic changes for conservation and reserve design. Provide examples of species and habitat types that may be particularly vulnerable to climate change.