UNIVERSITY OF NAIROBI

COLLEGE OF HUMANITIES AND SOCIAL SCIENCES/
COLLEGE OF BIOLOGICAL AND PHYSICAL SCIENCES

FACULTY OF ARTS/
SCHOOL OF PHYSICAL SCIENCES

In collaboration with
CENTRE FOR OPEN AND DISTANCE LEARNING

DEPARTMENT OF GEOGRAPHY
AND ENVIRONMENTAL STUDIES

CGP/SGP 106
EAST AFRICAN ENVIRONMENTS

Written by
Dr. Kennedy Japhan Omodo
and
Ms. Assumpta Belinda Rego

Reviewed by
Dr. Alice Odingo
CGP/SGP 106: EAST AFRICAN ENVIRONMENTS

Published by
University of Nairobi Council
P.O. Box 30197 Nairobi
KENYA
(2010)

Printed by
College of Education and External Studies
University of Nairobi
P.O. Box 30197 Nairobi
KENYA
(2011)

@ University of Nairobi Council (2011), all rights reserved.
No part of this Module may be reproduced in any form or by any means without a written permission from the publishers
Introduction

Dear learner, welcome to this course unit SGP/CGP106; the East African Environment (EAE). It consists of two parts: Part 1 introduces the learner to the concept of the East African environment; comments on its strategic importance, discusses the implications of its location and size and examines the role of geography as an integrative discipline. It also discusses the principal physical components of the EAE which provide the necessary resources for its various developmental sectors such as agriculture, energy, minerals, ecotourism, its marine biodiversity and climate as it relates to development. This part, which mainly consists of nine lectures, outlines the geological and major physiographic features of the EAE, explains the origin, characteristics, and significance of the highlands and the Eastern Rift Valley systems, together with its striking volcanic landforms. The uniqueness of the coastal plain is then highlighted with its spectacular marine biodiversity of coral reef ecosystem. Finally it focuses on soils, vegetation, wildlife as well as climate and development. Part 2, comprising five lectures, focuses on the principal components of the human environment including aspects such as demographic dynamics, infrastructure, agriculture, industrialization and urbanization in East Africa. These issues are very relevant to the sustainable development of the livelihoods of the East African people.

Dear learner, this module also includes a variety of challenging activities, many of which contain a fieldwork component to support your growth in knowledge and understanding. Do read and think about issues discussed in this module!
General Objectives

1. To introduce the learners to the concept of the East African Environment, highlight its strategic importance in this part of Africa, discuss the major implications of location and size and finally examine the role of geography as an integrative discipline in an increasingly global world.

2. To discuss, with specific examples, the principal physical components of the East African environment on which development is based. The following series of nine lectures will outline the major geographic and physiographic features in the EAE; explain the origin, characteristics and importance of the highlands, the Rift Valley system and its volcanic landforms. It will also discuss the uniqueness of the coastal plain with its unique marine biodiversity, soils, vegetation and wildlife, and finally comment on climate as it relates to development.

3. To highlight on the major human environment issues such as demographic dynamics, infrastructure, agriculture, industrialization and urbanization as they influence development.
TABLE OF CONTENTS

PART I
PRINCIPAL PHYSICAL COMPONENTS OF THE EAST AFRICAN ENVIRONMENT

Lecture One: The Concept of the East African Environment (EAE) .........................1
1.1 Introduction........................................................................................................1
1.2 Objectives .........................................................................................................1
1.3 The Strategic Importance of the EAE ..............................................................1
1.4 The location and size of the EAE and its implications ....................................2
1.5 The Concept of the EAE ..................................................................................4
1.6 Geography as an integrative discipline ............................................................6
1.7 Summary ..........................................................................................................8
1.8 Activity ............................................................................................................8
1.9 References .......................................................................................................8

Lecture Two: Geological and Physiographic Features of the EAE ....................9
2.1 Introduction ......................................................................................................9
2.2 Objectives .......................................................................................................9
2.3 The Geological History of East Africa ...........................................................9
2.4 Physiographic Evolution of Features ............................................................15
2.5 Changes in the East African Relief and Drainage Systems .........................16
2.6 Summary .......................................................................................................19
2.7 Activity ............................................................................................................20
2.8 References .....................................................................................................20

Lecture Three: The Highlands and the Eastern Rift Valley System ..................21
3.1 Introduction ...................................................................................................21
3.2 Objectives ......................................................................................................21
3.3 The Highlands and the East African Rift Valley System ...........................21
3.4 Major Highlands and the East African Environment ....................................23
3.5 The Great Eastern African Rift Valley System .............................................26
Lecture Seven: Vegetation in the East African Environment

7.1 Introduction
7.2 Objectives
7.3 Factors influencing the spatial distribution of vegetable in the EAE
7.4 Overview of the major vegetation types in East Africa
7.5 The East African mountain vegetation zonation and characteristics
7.6 Summary
7.7 Activity
7.8 References

Lecture Eight: Wildlife Management and Conservation in the EAE

8.1 Introduction
8.2 Objectives
8.3 Importance of Wildlife in the EAE
8.4 Domestication of Wild Game Species
8.5 Participation in Wildlife Management by Local Communities
8.6 Summary
8.7 Activity
8.8 References

Lecture Nine: Climate and Development in EAE

9.1 Introduction
9.2 Objectives
9.3 Climate as a significant factor in the EAE
9.4 Concepts of Weather, Climate, Meteorology and Climatology
9.5 Factors affecting the climate and development in East Africa
9.6 The distribution of rainfall in the EAE and Climate Change
PART II
PRINCIPAL HUMAN COMPONENTS OF THE EAST AFRICAN ENVIRONMENT

Lecture Ten: The Demographic Dynamics of EAE
10.1 Introduction
10.2 Objectives
10.3 Population Characteristics
   10.3.1 Population Growth
   10.3.2 Population Distribution and Densities
   10.3.3 Fertility and Mortality
   10.3.4 Economy of East African Environment
10.4 Summary
10.5 Activity
10.6 References

Lecture Eleven: Socio-Economic Infrastructure in EAE
11.1 Introduction
11.2 Objectives
11.3 Concept of Infrastructure
   11.3.1 Economic Infrastructure and Development in East Africa Environment
   11.3.2 Socio-economic Infrastructure and Development in East Africa Environment
11.4 Summary
11.5 Activity
11.6 References

Lecture Twelve: Agriculture and Development in EAE
12.1 Introduction
12.2 Objectives ........................................................................................................132
12.3 Definition of Agriculture and Its Evolution ....................................................133
12.4 Historical Perspectives of Origins of Agriculture .............................................133
12.5 Dispersal of Crop Plants and Domesticated Animals .......................................135
12.6 Agriculture and Underdevelopment ................................................................135
12.7 Significance of Agriculture in the Economy of EAE .......................................137
12.8 Challenges Facing the EAE region’s Agricultural Sector ...............................138
12.9 Summary ..........................................................................................................140
12.10 Activity ..........................................................................................................140
12.11 References ......................................................................................................140

**Lecture Thirteen: Industrialization in EAE** ................................................................141
13.1 Introduction ..........................................................................................................141
13.2 Objectives ..........................................................................................................141
13.3 The Urbanization Base of Industrialization ......................................................141
13.4 The Nature of Industrialization in East African Environment ........................142
13.5 Physical and Human Factors in Industrialization in EAE ..............................144
13.6 The Problems Facing Industrialization in EAE ..............................................147
13.7 Summary ..........................................................................................................149
13.8 Activity ..........................................................................................................149
13.9 References ......................................................................................................149

**Lecture Fourteen: Urbanization in EAE** .................................................................150
14.1 Introduction ..........................................................................................................151
14.2 Objectives ..........................................................................................................151
14.3 Concept of Urbanization ....................................................................................151
14.4 The Level and Rate of Urbanization .................................................................152
14.5 The Pattern of Urbanization ..............................................................................153
14.6 The Functions of Urban Centres .......................................................................154
14.7 The Impacts and Problems of Urbanization .....................................................157
14.8 Summary ..........................................................................................................160
14.9 Activity ..........................................................................................................160
14.10 References ....................................................................................................161
### LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The Concept of the East African Environment</td>
<td>5</td>
</tr>
<tr>
<td>2. Geography as an Integrative Discipline</td>
<td>7</td>
</tr>
<tr>
<td>3. Structural Geological Sketch of East Africa</td>
<td>10</td>
</tr>
<tr>
<td>4. The Geology of East Africa</td>
<td>12</td>
</tr>
<tr>
<td>5. A Tentative Reconstruction of the Drainage in the Miocene—Early Pliocene Period</td>
<td>17</td>
</tr>
<tr>
<td>6. The Present Drainage System of the East African Environment</td>
<td>18</td>
</tr>
<tr>
<td>7. Cross-section of the Ruwenzori Mountains (5110m)</td>
<td>24</td>
</tr>
<tr>
<td>8. The Afro-Arabian Rift System</td>
<td>27</td>
</tr>
<tr>
<td>10. Cross-section of a Composite Cone or Strato-Volcano</td>
<td>35</td>
</tr>
<tr>
<td>11. Stages in the Formation of a Caldera</td>
<td>36</td>
</tr>
<tr>
<td>12. A Simplified Cross-section of Mount Kenya (5199m)</td>
<td>37</td>
</tr>
<tr>
<td>13. Cross-Section of an Acid Lava Dome</td>
<td>39</td>
</tr>
<tr>
<td>14. Karst Topography</td>
<td>45</td>
</tr>
<tr>
<td>15. Seascape at the East African Coast</td>
<td>50</td>
</tr>
<tr>
<td>16. Concept of a Catena and Its Attributes</td>
<td>59</td>
</tr>
<tr>
<td>17. The Vegetation Zones of Mt. Kenya (Modified from Coe 1967)</td>
<td>73</td>
</tr>
<tr>
<td>20. The Upper Montane Zone of Mt. Kenya</td>
<td>78</td>
</tr>
<tr>
<td>21. Orographic or Relief Rainfall</td>
<td>99</td>
</tr>
<tr>
<td>22. Convectional Rainfall</td>
<td>101</td>
</tr>
<tr>
<td>23. Mean Annual Rainfall in East Africa</td>
<td>102</td>
</tr>
</tbody>
</table>
LIST OF TABLES

Table | Page
---|---
1. East African Environment Statistics | 13
2. The Geological Time Scale and Major Events in the East African Environment | 13
4. Measurement of Major Weather and Climate Elements | 96
5. Town X: Temperature and Rainfall Statistics | 97
6. Selected Adaptation Options in Northern Kenya | 105
7. Mid-Year Population | 110
8. Annual Population Growth | 111
9. Mid-Year Population Density | 112
10. Crude Birth Rate | 115
11. Crude Death Rate | 115
12. Life Expectancy at Birth | 118