General Certificate of Education
June 2007
Advanced Level Examination

ASSESSMENT and QUALIFICATIONS ALLIANCE

GEOGRAPHY (SPECIFICATION B) **GGB5/PM**
Unit 5 The Synoptic Unit
Advance Information Booklet

Date of Issue: 1 May 2007

You will need no other materials.

Instructions

- This Advance Information Booklet will be issued on 1 May 2007 in advance of the examination for Unit 5. You should make yourself familiar with the information in the booklet.
- This material must be kept **unmarked** for use in the forthcoming examination.
- In order to demonstrate your synoptic ability and your issue evaluation skills, you should, in each of your answers, wherever possible, use a range of information, ideas and examples from other modules you have studied to show your understanding of the connections between different aspects of your course and the topic featured in this booklet.
- The centre 4-page section of this booklet contains colour photographs and a map, which should be detached.

STUDY ALL THE INFORMATION IN THIS BOOKLET

This exercise is based on Sections 13.1 and 13.2 of the Specification.
The information in this booklet comprises the following:

* The centre 4-page section of this booklet contains colour photographs and a map, which should be detached.

Item 1 The Serengeti Grasslands

The Serengeti Grasslands lie just south of the Tanzanian/Kenyan border, close to the equator (between 2 °S and 4 °S). They occupy most of the centre, the east and the south of the Serengeti National Park. Climatically, the eco-region falls within the seasonal tropics. Mean maximum temperatures are between 24 °C and 27 °C, and mean minimum temperatures between 15 °C and 21 °C.

The underlying soils and materials of the Serengeti plains consist of volcanic ash derived from a number of local volcanoes. The dormant caldera of Ngorongoro, the Kerimasi Volcano and Mount Lengai (last eruption in 1966) have all contributed volcanic ash to these soils. These soils have characteristic plant communities, distinguishing the eco-region from its neighbours. Topographically, the eco-region comprises flat to slightly undulating grassy plains, interrupted by scattered rocky areas (kopjes) which are parts of the Precambrian basement rocks protruding through the ash layers.

Biodiversity features

The Serengeti Grasslands are vital to the cyclical movement of millions of large mammals in the region. Although populations fluctuate, there are an estimated 1.3 million blue wildebeest, 200 000 plains zebra, and 400 000 Thomson's gazelle migrating each year between this eco-region and the Southern *Acacia* Bushland eco-region in Southern Kenya. A large number of associated mammalian predators are also involved in these movements. By the onset of the dry season (late May), the grasses on these plains have either dried out or been eaten down to stubble, and water is scarce. This triggers the massive migration of wildebeest and zebra, followed later by Thomson's gazelle and eland, from the plains to the *Acacia* Bushland. At the beginning of the wet season, these animals complete the cycle and return to the plains.

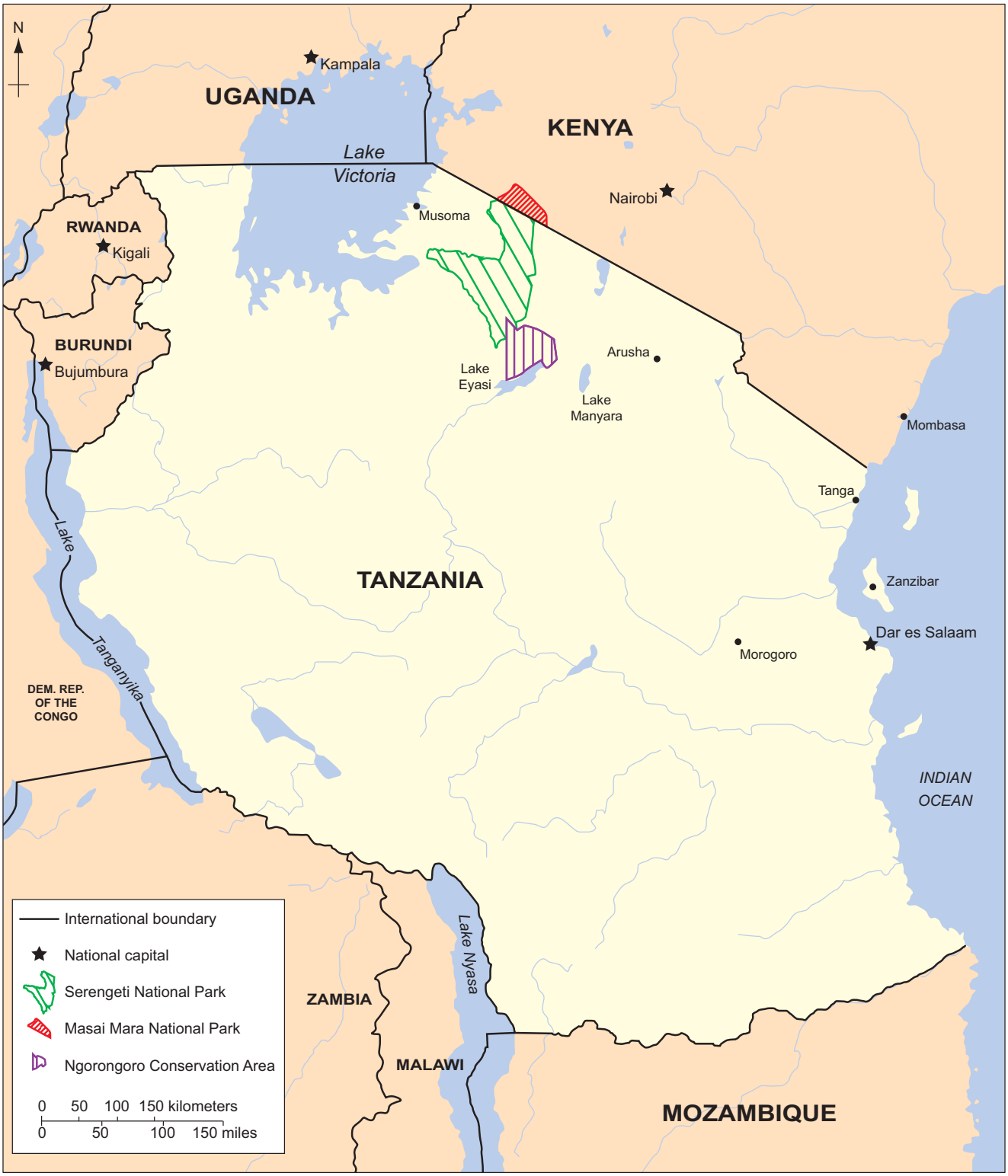
Fires, usually set by humans, are probably also an important disturbance in this eco-region. Certain species, including Thomson's and Grant's gazelles, impala and wildebeest, have been seen to favour grazing on the green flush that emerges after burning.

Current status

Much of the eco-region's habitat occurs within protected areas, most of which are joined into a continuous habitat block. The protected areas network includes parts of the Serengeti National Park (SNP) and the Ngorongoro Conservation Area, both of which have been designated as World Heritage Sites and Biosphere Reserves. The protected areas network is probably large enough to ensure the survival of the habitat and its biodiversity values. There has been little loss of habitat within the protected areas, except for small areas used for tourist hotels. Areas outside these protected sites, however, have experienced a rapid expansion of human settlement and agricultural development in recent years.

Turn over ▶

Figure 1


N
Kampala
UGANDA
KENYA
Lake
Victoria
Nairobi
Musoma
RWANDA
Kigali
BURUNDI
Bujumbura
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Eyasi
Arusha
Lake
Manyara
Mombasa
Tanga
Lake
Tanganyika
TANZANIA
Zanzibar
Dar es Salaam
Morogoro
DEM. REP.
OF THE
CONGO
INDIAN
OCEAN
Lake Nyasa
ZAMBIA
MALAWI
MOZAMBIQUE
International boundary
National capital
Serengeti National Park
Masai Mara National Park
Ngorongoro Conservation Area
0 50 100 150 kilometers
0 50 100 150 miles

Types and severity of threats

While Masai pastoralists occupy the Ngorongoro Conservation Area, there are no people living within the Serengeti National Park. However, the area just outside the western frontier of this park has a dense resident population, growing at 4% a year. Not only is the human population increasing, but there is also a concomitant increase in livestock numbers, and much of the area is being converted into cropland, while the demand for land rises. Although agriculture is the main source of income, many people have been attracted to the area by the wildlife resources and tourism opportunities which the park presents. At present, it is estimated that 200 000 animals within the Serengeti National Park are killed annually in poaching operations that have graduated from subsistence to commercial levels. It is hoped, however, that schemes to give local communities legal rights to manage the wildlife around their villages will reduce this. There are also plans to channel more money earned from tourist activities within the park back into the community, as the contribution from tourism to the local economy has been relatively low.

Item 2 Serengeti Woodlands Study (adapted from the Serengeti website)

Today the Serengeti National Park has areas of open plains and areas of woodland. The woodlands cover the majority of the northern part of the park and the western part of the park. The Serengeti was not always like this, and in fact shifted from being almost entirely open plains to dense woodland twice in the last century. If visitors to the park look carefully, they can see the product of these changes. Scattered throughout the landscape are a few very large, old Acacia trees that began life in a burst of growth in 1900. Spread throughout the park are areas of dense bush and trees that began life in a similar burst during the late 1970s. This is a story of disease, hunting, weather, illegal poaching, and is one of the most dramatic stories of the ecology in the Serengeti.

The life of the average tree is extremely difficult in the environment of Serengeti with the many animals it contains. This difficulty means that there are only rare times when trees can flourish and grow. While there are many factors which affect a tree, the two most important appear to be fires and grazing by animals.

Fire

Every year, fires burn inside the Serengeti National Park. Fire is an integral part of the ecology of savannas, and is not necessarily a bad thing in the right quantities. During the dry season (May–November), the lush green grasses of the wet season dry out and become perfect fuel for bush fires. A hot fire, such as those at the end of the dry season, can kill small trees. The trees fight back as they get old, growing a thick layer of insulating bark, while at the same time removing the water and sunlight that grass needs to grow around the tree, thus reducing the temperature of the fires. If there are a few years without fires, small trees can grow large and reach what is called a size of escape, at which point they are no longer damaged by fires. Thus, for the Serengeti to have changed from grassland to woodland, there must have been a few years in its history in which there were no fires.

Animals

Trees are eaten by a variety of animals throughout their lifetimes. This is because trees are generally more nutritious and easier to digest than grasses. While trees are seedlings, they are eaten by Thomson's gazelle, herds of impalas and other small browsers. As trees grow larger, they are eaten by giraffe. All through trees' lives, they are eaten by elephants, from the seedling stage to the adult stage. In order to grow to become a tree, a seedling must avoid being eaten by all of these animals. While each of these animals can limit the number of seedlings that grow larger, the most important seems to be the elephants, mostly because of the number of seedlings that they eat. Thus, for the Serengeti to have changed from grassland to woodland, there must have been a period without elephants.

Why the Serengeti changed

The Serengeti changed from a grassland state to a woodland state twice in the last century. The few old, very large scattered trees dotting the Serengeti landscape started life about 1900, followed by a slow decline in tree numbers mainly due to elephants, fire and disease, leaving the few that we see today. The second group of smaller trees established itself during the period 1976–83, and these trees are still growing in abundance today. Both of these groups were able to grow because for two periods in the Serengeti there were no elephants and no fires.

Rinderpest

Rinderpest is a cattle disease that came to East Africa in about 1896. The effect on both the wild animals and the cattle of native peoples in the area was devastating. Most of the Serengeti wildebeest died in a few short years, as did the cattle of the people surrounding the park. With no cattle, a famine and rapid emigration from the area took place. With no people in the area, there was no one to light fires, and, for a few years, the Serengeti went un-burned.

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At the same time, the trade in ivory was at its peak, decimating the elephant numbers all over East Africa. With no fires and no elephants, young trees were able to grow and flourish. This was the first big establishment of the century.

The effect of Rinderpest lasted for many years, with the wildebeest not regaining their current high numbers until the 1970s, seventy years after the disease was first introduced. Elephants were only reported to re-enter the Serengeti during the 1930s and until the 1950s were considered a new species in Serengeti. Only when old hunting records and explorer's diaries were consulted was it found that they had been in Serengeti before the ivory trade removed them.

Weather

During the late 1970s and early 1980s, the weather patterns in and around Serengeti changed. The seasonal rains became more spread-out, meaning that the grasslands did not dry and were unable to burn during the 'dry season'. During this time, there was, unfortunately, an enormous upswing in the illegal ivory trade. Elephants were killed or fled to safer areas. With both fire and elephants removed, the trees again established themselves in a burst. These trees are now about 30 years old and range from two to five metres tall, forming both dense thickets and standing singly.

Recent situation

Today, the woodlands of Serengeti are growing taller, as the trees which started during the mass-establishment of the 1970s mature. The trees of the 1900 establishment are growing older and dying. You can still see the large, old Acacia trees around Seronera, and the younger trees throughout Serengeti.

There are interesting questions being asked about the trees today, including 'what is the effect of all of this vegetation change on the animal species of Serengeti?'

There has been a large increase in the number of impala inside the park. These animals seem to be much more successful in the woodlands than in the grasslands, and have increased as the woodlands have increased. These and other changes may only be the tip of the ecological iceberg of woodland-related change which scientists are studying today.

In the past, elephants and fire have controlled the establishment of new trees. Today, both elephants and fire are monitored closely. Fire is monitored and controlled through the Park Ecology Department which burns fire breaks to stop the spread of large fires, and conducts 'cool' early-burns in fire-prone areas. Elephants have recovered since the heavy illegal poaching during the 1970s, it appears both by re-entering Serengeti and by breeding quickly. Most female elephants in the park have several offspring with them, forming large family groups.

Item 5 Rainfall in East Africa

Within Tanzania there is enormous variation in rainfall amount and seasonal distribution.

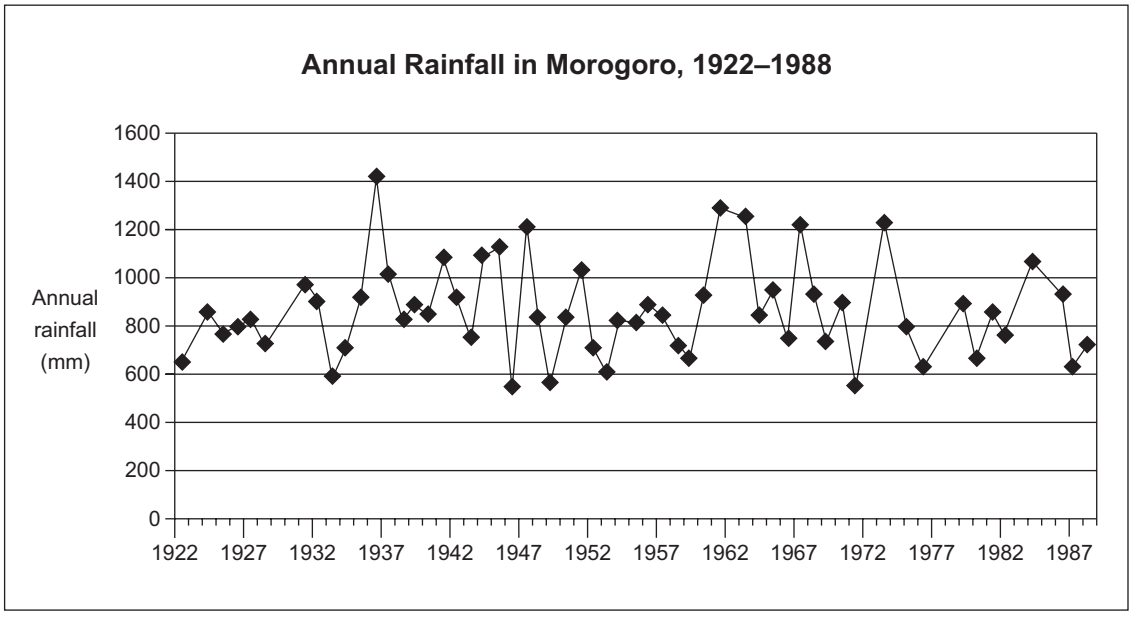
Mean monthly rainfall data for four stations in Tanzania was set out in **Figure 2**.

Figure 2

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Musoma (1134m) Rainfall (mm)	55	85	120	195	105	20	15	15	30	50	105	75
Arusha (1400m) Rainfall (mm)	65	75	140	230	80	10	5	5	10	20	105	95
Tanga (20m) Rainfall (mm)	45	35	110	230	255	80	55	60	75	105	130	70
Morogoro (900m) Rainfall (mm)	95	90	150	210	90	35	10	5	10	30	60	90

Rainfall is also variable from year to year, as can be illustrated by the figures for Morogoro over a 66 year period, shown in **Figure 3** below.

Figure 3



Annual rainfall figures for some years are not included in this graph.

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Item 2: Serengeti Woodlands Study by Greg Sharam, www.serengeti.org
Item 3: © David and Brenda Floyd.
Item 4: Philip's Atlas of the World © 2005 Philip's.
Figure 2: *Climate Research 13* (231-241), T. A. Kabanda and M. R. Jury, pp232, 1999.
Figure 3: *Livelihoods, Vulnerability and Adaptation to Climate Change in the Morogoro Region, Tanzania*, Jouni Paavola, CSERGE, an ESRC Supported Centre Working Paper EDM 04-12, www.uea.ac.uk