General Certificate of Education
Advanced Level Examination
June 2012

Geography GEO4B/PM

Unit 4B Geographical Issue Evaluation
Advance Information Booklet

Date of issue: On or after Sunday 1 April 2012

You will need no other materials.

Instructions

- This Advance Information Booklet will be issued on or after Sunday 1 April 2012 in advance of the examination for Unit 4B. You should make yourself familiar with the information in the booklet.
- This booklet must be kept **unmarked** for use in the forthcoming examination.

STUDY ALL THE INFORMATION IN THIS BOOKLET

The information in this booklet comprises the following:

Item 1 An introduction to the geography of the Himalayas

Some people think that the Himalayas form an area of fragile environment, although to other people they appear to be an area of cold, hard, high mountains where little can threaten the natural environment.

Structure

The Himalayas extend about 2500 km, in a curve, from the Pamir Knot in the north-west to the valley of the Brahmaputra River in the east. They range between 100 and 400 km in width and cover an area of 612 021 km^2.

The Himalayas extend through Pakistan, India, Nepal, China and Bhutan. See **Figure P1** below.

Figure P1

The Himalayas are divided into several parallel ranges. From south to north they are:

- Sub Himalayas (with an average altitude of 900 to 1200 metres)
- Lower Himalayas (with an average altitude of 3700 metres)
- Great Himalayas (a single range rising above 6000 metres with nine of the fourteen highest peaks in the world, including Mount Everest)
- Tibetan Himalayas or Tibet Plateau (with an average altitude of 4000 to 4900 metres).

Item 1 continues on the next page

Drainage
There are about 15 000 glaciers in the Himalayas. They store about 12 000 km^3 of fresh water.

The higher regions of the Himalayas are snowbound throughout the year, even though they are so close to the tropics. The Himalayas provide the sources for several large perennial rivers, most of which combine into two large river systems, the Indus and the Ganges-Brahmaputra.

Climate
There are a number of parallel climate zones in the Himalayas and these are strongly influenced by altitude.

In the southern foothills of the Sub Himalayas the climate is tropical, with average summer temperatures of about 30 °C and winter temperatures of about 18 °C.

In the valleys of the Lower Himalayas conditions are warm temperate, with average summer temperatures of about 25 °C and cool winters.

At higher altitudes in the Lower Himalayas there are cool temperate conditions, with average summer temperatures of 15 to 18 °C and winters below freezing.

The highest parts of the Lower Himalayas and the lower slopes of the Great Himalayas have a cold alpine climate, where summers are cool and winters are severe.

At elevations above 4880 metres the climate is very cold, with average temperatures below freezing all year round.

The eastern part of the Himalayas receives heavy rainfall from the monsoon winds which blow onshore from the Bay of Bengal and which are forced to rise by the mountains. The western part is drier.

Figure P2 – Climate of Kathmandu

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average Temperature (°C)	10	12	16	20	23	24	25	24	23	20	15	11
Precipitation (mm)	15	41	23	58	122	246	373	345	155	38	8	3

Temperatures in the area around Mount Everest are on average 10 to 15 °C colder than the above figures up to about 4250 metres, the highest point reached on a short Everest trek.

Vegetation
Himalayan vegetation is based on altitude and rainfall and can be classified as follows.

Tropical zone – up to 1200 metres. Tropical evergreen forests with rose, chestnut, bamboo, alder, pine, laurel and palm.

Subtropical zone – up to 2200 metres. Forests are dominated by oak and magnolia lower down, and by cedar, birch, hazel, maple and spruce at higher levels.

Alpine forest zone – 2200 to 2700 metres, with juniper, rhododendron, mosses and lichens.

Several kinds of flowering plants are found from 2700 to 3600 metres.

Alpine meadows are found up to about 5000 metres.

Above this, tundra vegetation gradually gives way to rock and ice.

Economy
The economy of the Himalayas as a whole is poor with low per capita incomes. Much of the area has a very low economic growth rate and a high rate of population growth. This leads to a low, often falling level of gross national product per head. Most of the population is dependent on subsistence or near-subsistence agriculture.

Modern industries are lacking and mineral resources are limited.

The Himalayas have a lot of potential sites for hydroelectric power but the development of these resources would need outside capital investment. The skilled labour needed to organise and manage development of natural resources is limited because of low literacy rates.

Most of the Himalayan communities face malnutrition, a shortage of safe drinking water, and poor health and education services.

Since 1950, tourism has become a major growth industry in the Himalayas. Some years, nearly one million visitors come to the Himalayas, for mountain trekking, wildlife viewing, and pilgrimages to major Hindu and Buddhist sacred places. The number of foreign visitors has increased in recent years, as organised treks have become popular. While tourism is important to the local economy, it has had an adverse impact on regions where tourist numbers exceed the capacity of recreational areas.

Figure P3 – Total tourist arrivals in Nepal, excluding Indians, per month (2007)

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Note that the main season for climbing in the highest peaks runs from September to early November. The secondary season is in March and April. The main trekking seasons, at lower altitudes, last slightly longer.

Figure P4 – Tourist arrivals in Nepal, by type (2007)

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Item 2 Tourism and the fragile environment of Nepal

Khumbu is the main trekking region. It lies to the north-east of Kathmandu and includes Mount Everest. During the peak tourist season there are up to 40 000 tourists aiming to climb and trek, at some considerable altitude, in the Khumbu region.

The tourists obviously provide a major economic resource for poor people in a very undeveloped and difficult region. However, at the same time all these people, both the tourists and the Nepalese who move to the area, present many threats to the environment.

In the 1990s, one American climber returning from Everest highlighted one of the most obvious problems on the mountain when he described it as 'the highest junkyard in the world'. Rubbish left by earlier expeditions included aluminium cans, glass, clothes, tents, used syringes and unused medical supplies, oxygen bottles and even dead bodies on inaccessible rock faces and in crevasses. It was estimated then that every team that reached base camp was leaving behind 500 kg of rubbish, and this does not decompose in the freezing conditions. An associated problem is the disposal of waste by tossing it into glacial crevasses. This is carried along as the ice moves downhill and it appears later as ground-up particles when the ice melts.

Another problem is air and water pollution throughout the Khumbu region. This is caused by the planes and lorries that bring tourists and their supplies into the region, by the wood fires that are lit by the tourists and by their hosts, by the kerosene stoves that are also used and by the sewage produced by all these people. There are few provisions for controlled disposal of sewage even in Kathmandu; at base camp, most expeditions simply dig or scrape holes which they attempt to cover up when they leave, but here too the low temperatures mean that decomposition is very slow.

Water supplies for some villages, which have traditionally been fed by small-scale canal systems from up the valleys, are often very stretched now. Providing water supplies for tourists can seriously deplete local irrigation systems and damage traditional subsistence farming practices.

However, after the alarm was raised in the 1990s, many initiatives were put in place to clean up the mountain. For instance, all expeditions have to spend an acclimatisation period of about a month when they have to get used to living at high altitude before heading for the highest peaks, and some of them organise cleaning expeditions while they are acclimatising. Other groups have incentive schemes for the Sherpas, by which they pay them to bring down rubbish as well as paying them to carry up supplies. Recently, the Nepalese government has started to demand a deposit from each expedition to the mountains and this is paid back only if they return with their rubbish.

Despite this, most expedition members to Everest are there for a once-only experience for which they have to pay substantial sums for access and for guides. During their trip they are likely to be forced to push themselves to new limits of endurance and achievement. It is reasonable to assume that their priority at such a time will be personal survival rather than environmental concerns. Unless there is constant vigilance, climbers and trekkers seem likely to remain a threat to the Everest region.

The increasing numbers of trekkers bring their own problems to the region. The majority of the trekkers are in guided groups but many of these groups follow the same popular and accessible routes. Their sheer weight of numbers can damage the fragile paths, causing erosion of the slopes, or make the paths more susceptible to erosion during the rains of the wet monsoon season.

Most trekkers try to follow the old rule 'Leave nothing but footprints, take nothing but photographs', but some dig up rare wild flowers and shrubs which struggle to survive in this marginal environment. Most of these shrubs, intended for gardens back home, do not survive the journey anyway.

Again, many trekkers want to experience a 'Nepalese way of life' for at least some of their trip, by sleeping in houses in the villages. However, many expect a far higher standard than the Nepalese are used to and use more water, fuel and food than the locals. Of course they pay well for this, by Nepalese standards, but they still put increased strain on the environment. Moreover, they are bringing pressure on the local people to adapt their way of life to meet the needs of the tourist industry.

And finally, the tourists' means of transport into, around and out of the country place a big strain on the environment. The pollution from aircraft often remains trapped in the valleys by the surrounding mountains, and coaches and 4-wheel drive vehicles are putting increasing strain on both the limited local road networks and on the Nepal–India highways. So transport is causing localised environmental damage as well as contributing to possible global warming.

Tourists will continue to visit Nepal, probably in increasing numbers. If they are not to cause irreparable damage to the very environment that attracts them, they, and the organisations that profit from them, will have to continue to develop very strict codes of conduct to govern their behaviour.

Yaks are used to carry trekkers' supplies onwards from this overnight stop.

At base camp, two groups of tents are just visible amongst all the glacial moraine. This is November, when most mountaineers have left the climbing area.

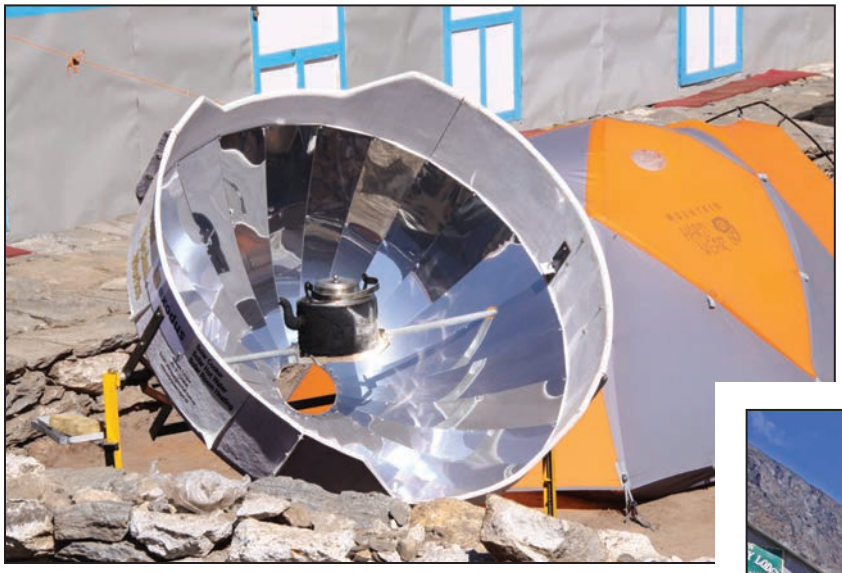
Turn over ▶

Item 3 Household energy issues in Nepal

About 80% of the 4.2 million households in Nepal use fuelwood, cattle-dung cakes and agricultural residues for cooking, and kerosene for lighting. Demand for fuelwood substantially exceeds the rate of regrowth, and this is leading to degradation of the land. Cooking indoors over open fires, and lighting with kerosene, gives dangerous exposure to air pollutants and a high risk of fire, particularly for women and young children who spend much of their time indoors. Also, women and girls have the drudgery of collecting fuelwood, which typically takes three hours each day.

The use of cattle dung to generate biogas is well known in the Indian subcontinent, but in no other place has it been used with such success as in Nepal. The scale of the programme is remarkable. Biogas already serves about one million people (almost 4% of the population of Nepal), and the biogas sector provides about 11 000 permanent jobs in the country. This success was achieved thanks to collaboration between many different organisations, including government agencies and NGOs, construction companies, donors, finance organisations and local village organisers.

Over 124 000 domestic biogas plants were installed in Nepal between 1992 and 2005. A house with a biogas plant can use it to replace nearly all the use of fuelwood, and make cooking easier, cleaner and safer. In 20% of houses, biogas provides safer lighting as well. This reduction of unsustainable fuelwood use also lowers carbon dioxide emissions, and the effluent from the biogas plant is a valuable organic compost.



Solar heaters are cheap to provide and very easy and efficient to use. They are increasingly being used for cooking by trekkers and local people.

Cakes of yak dung are made and stored for heating. In the background is a trekkers' lodge, but the dung is used mainly for heating homes.

Item 4 National energy issues in Nepal

Nepal has an estimated 83 000 megawatts (MW) of hydroelectric power (HEP) potential, of which 43 000 MW have been identified as economically feasible for development. Currently it is harnessing less than 1% of this potential. However, if only a small proportion were to be developed, the country could meet all its own needs and export a large surplus to India, potentially earning $2.7 billion per year.

Development on this scale might be feasible but would require Foreign Direct Investment (FDI) to meet most of the capital costs. Academics working with the government in Nepal have calculated that this level of development could lead to an 8% annual economic growth rate which would be enough to bring all but 10% of the population above the poverty line by 2027.

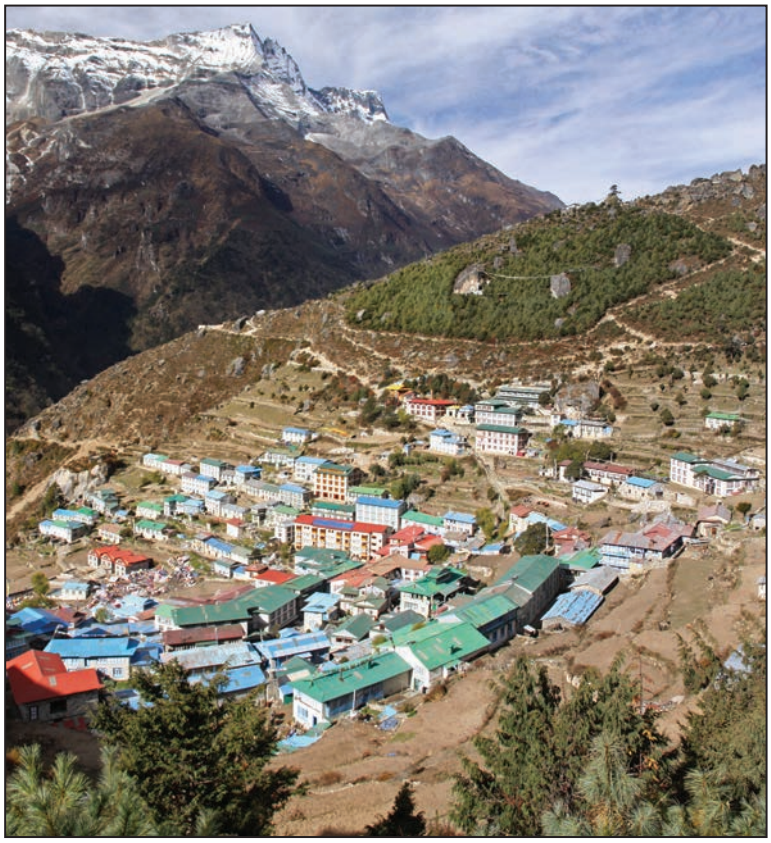
There were various proposals for developing HEP during the last century, beginning in 1911. However, few of these led to any serious development. They were frustrated either by reluctance of the government or the foreign investors to fully commit to the project, or by the high cost of overcoming the physical difficulties of the environment. However, almost all of the proposals to finance these projects came from outside the region — from developed countries or from the World Bank. Most of the recent proposals and the ones being actively considered at present have come from Indian or Indian–Nepalese joint investments. The Indian companies are perhaps best suited to operate in Nepal due to their geographical proximity and their cultural and political understanding of the Nepalese situation.

The construction of a hydroelectric project helps the economy of a region, and can also help its environmental and social development. Such projects promote local people's access to roads, schools, health centres, jobs and trade opportunities.

Moreover, because of the rising price of petroleum, HEP is becoming ever more economically attractive. It also offers clean energy, reduces greenhouse gas emissions and provides long-term energy security. FDI can bring training and new skills for Nepalese workers and new sources of tax revenue for the Nepalese government.

Item 4 continues on the next page

These valleys on the route to Everest are unlikely to be used for HEP. To do that would damage the tourist industry.



Item 5 The IPCC and the melting of Himalayan glaciers

In 2007, the Intergovernmental Panel on Climate Change (IPCC) produced a 3000 page report, an assessment of the current understanding of the world's climate patterns, which has become known as AR4 or the Fourth Assessment Report.

In this report there was a statement that Himalayan glaciers could disappear completely by 2035. As these glaciers play a crucial part in controlling hydrology in the whole of the northern part of the subcontinent, this statement was obviously viewed with huge alarm by people in the region and in the rest of the world.

Immediately a number of scientists disputed this figure, saying that such a rate of melting was most unlikely or was impossible. For instance, one glaciologist from the University of Innsbruck in Austria said: "It is so wrong that it is not even worth discussing."

When he realised that a mistake had been made, Dr van Ypersele, vice-chairman of the IPCC, said: "I don't see how one mistake in a 3000 page report can damage the credibility of the whole report. However, some people will attempt to use it to damage the credibility of the IPCC; but if we can uncover it and explain it and change it, it should strengthen the IPCC's credibility."

In 2009, four leading glaciologists prepared a letter for the Copenhagen Climate Conference. In it they stated that a complete melting by 2035 was physically impossible. In some of these glaciers the ice is 400 metres thick. That would just not melt in a quarter of a century, even if temperatures rose by 3 or 4 ºC right away. They said that this section of AR4 needed to be revised … but that the report's overall conclusion, that global warming is happening, remains beyond reproach.

Meanwhile, satellite evidence from the Himalayas shows that ice is certainly retreating more quickly now than it has ever done in recorded history. Though the consequences of this retreat, and of climate change in general, will not affect the Himalayas as fast as AR4 suggested, they will still bring about great changes. These changes will be complex but are likely to include:

- the disappearance of those ponds and streams fed by glacial meltwater as the glaciers themselves disappear
- changes to the river regimes in the Himalayas and to the south
- a less reliable water supply for some valleys and villages in the Himalayas
- changes in the vegetation pattern as temperatures rise and as plants can grow in areas where they could not grow before
- a possible extension of agriculture, herding and forestry into areas where they have not previously been feasible
- possible extinction of indigenous species of flora and fauna which are not able to adapt quickly enough to the changing climate conditions
- a spread of a 'desert-like' landscape caused by the deposition of unsorted rocky moraine by the melting glaciers
- an increase in avalanches because of rising temperatures and melting ice
- an increased threat of avalanches bursting lakes and reservoirs, possibly causing catastrophic flood events downstream.

Item 6 Further research

To see one person's impression of a trek in the Himalayas you should visit the following website:

aqa.org.uk/geo4b/june2012/images

The photographs on this site and in this booklet were made available by Nick Walker who, with his wife Chris, trekked to Everest Base Camp in 2009. You should study the photographs to see the extent to which they show the Everest region as a fragile environment under threat from tourists, trekkers, mountaineers and climate change.

To research what one organisation is doing to improve conditions in Nepal, particularly what it is doing to provide access to sustainable energy supplies, visit the following website:

http://practicalaction.org

Then follow the links to 'Where we work' and/or 'What we do'.

There are **no** suggestions in this booklet for planning and preparation of primary data collection.

END OF ITEMS

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Figure P1:	Collins Longman Student Atlas, New Edition, 2001, Pearson Education Ltd
Figures P3 & P4:	www.tourism.gov.np
Photographs on pages 7, 8 and 10:	Nick Walker