

Edexcel

A2

Geography

Unit 3 pre-release booklet, questions and answers

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Unit 3

Pre-release booklet

Section B

The following resources relate to Question 6.

Water management in China

Background

About 500 million people worldwide are chronically short of water. Global water demand is rising rapidly.

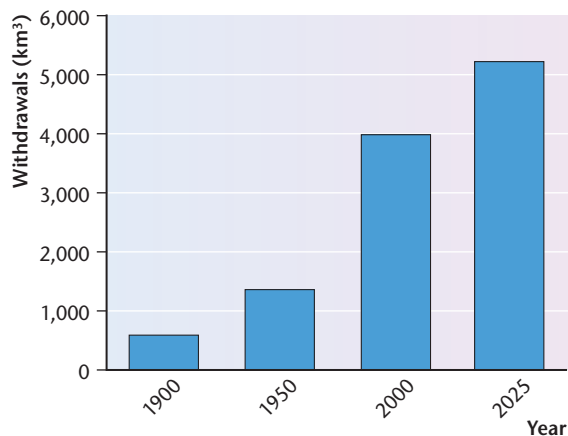


Figure 1 Global water withdrawals, 1990–2025

Water is used for three main purposes. Globally, domestic use accounts for 10%, industry 21% and agriculture 69% of total water consumption. There are significant variations around the world.

Figure 2 Water consumption in selected countries

Country	Domestic (m³ per person per year)	Industry (m³ per person per year)	Farming (m³ per person per year)	% of arable land irrigated
Sudan	32	8	1,160	12
India	52	35	553	30
China	32	126	333	39
USA	215	779	698	12

Organisations such as the UN talk of a global 'water crisis'. The 'crisis' relates to both the quantity and quality of water available in many parts of the world:

- More than 2 billion people live in areas of water stress.
- Where water is available, it is often unsafe.
- Fifty per cent of all disease in the developing world is related to water quality.
- Groundwater supplies are running out in many areas.
- Water availability for food production is falling in some areas.
- Biodiversity is being negatively affected by water supply schemes.

Future projections suggest that many areas of the world will face increasing water stress as supply fails to match demand.

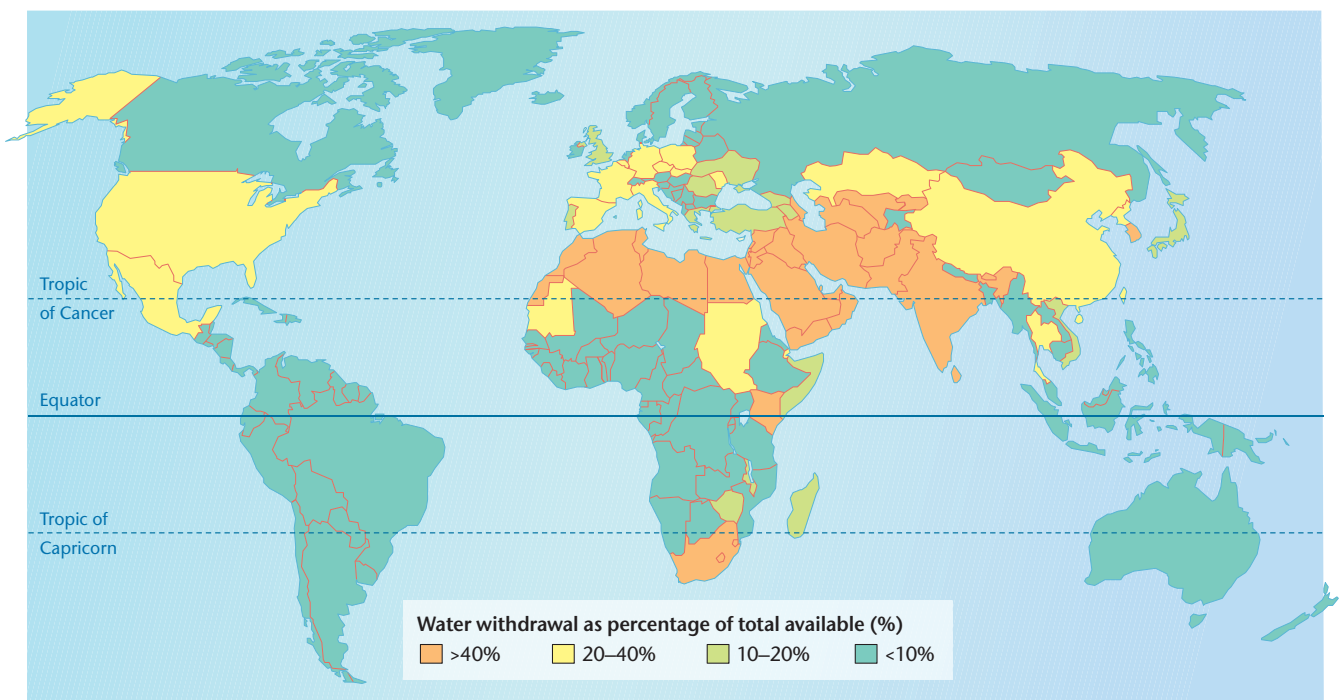


Figure 3 Projected water stress in 2025

Chinese water management

China's population accounts for about 20% of the global population, but it only possesses 7% of the world's renewable water resources. Its population is expected to grow from 1.28 billion in 2000 to 1.6 billion by 2030. In 2005, only 78% of the people had access to an adequate water supply and only 45% to improved sanitation – mostly in urban areas. Around 300 million people lack access to an adequate water supply.

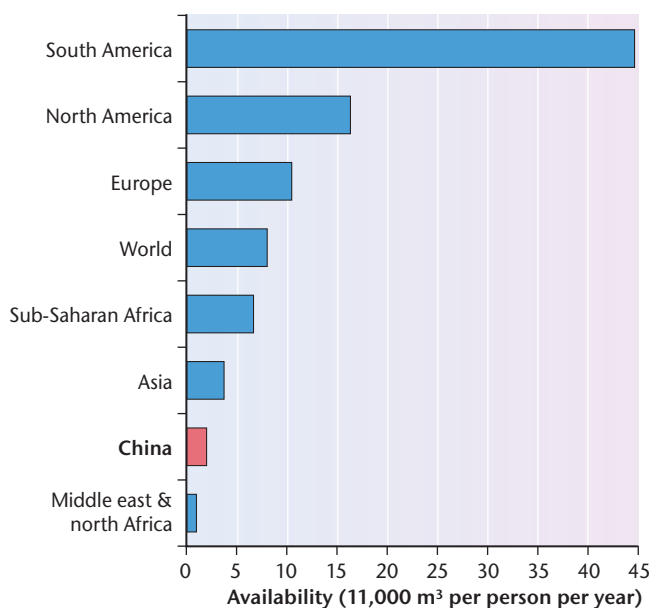


Figure 4 Water availability in China compared with other regions

China's economic miracle, which has sustained an annual growth in GDP of between 8 and 10% since the early 1990s, has lifted around 200 million people out of poverty. But there has been an environmental cost: 70% of China's lakes and five of its largest river systems are so polluted that they are dangerous to human health. In 2005, only about 20% of wastewater received any form of treatment.

Urban population in China, which accounts for 36% of the total population, is growing at 3.2% per year. Urbanisation and the growth of megacities are placing a great strain on already diminishing water resources. Nearly two-thirds of China's 660 cities are reporting water shortages. Many of these are located in coastal areas. Fifty cities are suffering from major subsidence due to the excessive pumping of groundwater.

Scientists have recently reported that glaciers in the Qinghai-Tibet plateau of western China are melting more rapidly than in the past. Some glaciers are shrinking at a

rate of 7% per year as a result of rising temperatures. The plateau appears to have warmed by at least 2°C since the 1980s. This warming may accelerate rapidly as ice and snow melt, exposing dark coloured rock that lies below. As a consequence this changes surface albedo and creates a positive feedback. The Yangtze, Yellow, Brahmaputra, Mekong and Salween rivers have their sources in the plateau glaciers. These rivers supply more than 500 million people downstream. The Yangtze River accounts for 40% of China's freshwater resources and supplies the water needs of half of all rice, grain and fisheries production.

China uses 7–15 times more water per unit of GDP than many developed countries.

- ▶ One tonne of water used in China produces around \$2–3 of GDP, compared to \$28–30 in the USA.
- ▶ China's water supply systems are generally highly inefficient, with loss rates of 20% commonplace.
- ▶ Water is sold in China at 70 to 80% of the cost in developed countries, and at 40% below the cost of producing it.
- ▶ Typical water costs for agriculture are 40c per m³, compared with production costs of 70c. Some water experts believe that charging \$2–3 per m³ would lead to more efficient use.
- ▶ As a result of water shortages, Chinese industry lost \$25 billion in output value annually between 2001 and 2005. In many coastal industrial regions in the north, demand exceeds supply by between 20 and 35%.
- ▶ On the north China plain, in the 1950s farmers could strike water with a well 2 m deep. They now have to drill to more than 200 m as a result of over-abstraction of the aquifers. Thousands of wells are illegal, adding to the problems of managing a finite resource. Many cereal farms are approaching crisis point because of lack of water.

The distribution of water resources in China does not match that of population. Two-thirds of China's arable land is north of the Yangtze River, but only 20% of its water resources. The Yellow, Huaihe and Haihe river basins account for one-third of China's population and GDP, but only 8% of its water resources. In the Haihe River basin, 90% of available water resources are now used, and 50% in the Yellow River basin. In the Yangtze and Pearl basins, the figure is less than 15%. The recommended sustainable level of use is 40% of surface and groundwater resources.

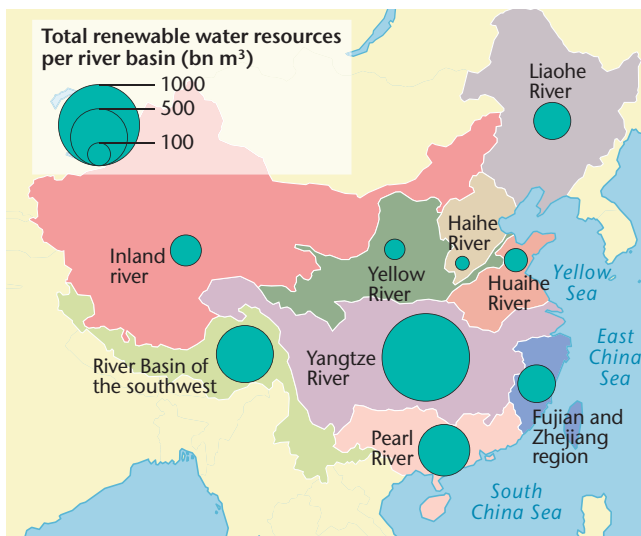


Figure 5 Water availability in China, by river basin

Along the Haihe River, 3,800 km³ of wetlands have been reduced to 540. This reflects the national trend: 25% of China's wetlands have been lost since the 1950s, and more than 1,000 lakes have been drained. Much of the wetland has been lost to industry and urbanisation or to falling water tables.

Hydrological engineering has a long history in China. Recently a number of colossal multi-purpose schemes have been completed or started.

China plans to use around 50 billion m³ of seawater annually by 2010, and by using desalination plants to produce 800 million to 1 billion litres of freshwater per day by 2010. It currently has about 20 small desalination plants, but plans to invest over \$50 billion in large plants by 2015. It is also experimenting with the seawater irrigation of GM crops.

In 2012, the Three Gorges dam will be completed with the filling of its reservoir (Figure 6).

Figure 6 The Three Gorges dam factfile

Cost	\$25 billion+
Key statistics	2.3 km-long dam wall, 100 m-high dam wall 600 km-long reservoir flooding an area of 1,084 km ³
Purpose	Planned to produce 100 billion kWh of electricity, control flooding for 15 million people, improve water supply and navigation
Completion	Begun in 1993, currently producing HEP, final stages completed by 2012
Relocation	Over 1 million people relocated from reservoir site. Some close by but some in distant regions

Around 1,200 villages and two major towns were abandoned and relocated as flooding of the Three Gorges reservoir began. Although people received compensation, there were allegations that money was siphoned off by corrupt officials. The government argued these were minor issues when set against the clean HEP the dam would produce, improved flood control, and the prestige the megaproject would bring to China. There are some concerns that flooding will continue, as during major flood events water will still have to be released downstream. Other impacts and potential problems include:

- ▶ the flooding of 1,300 archaeological sites, and the movement of some culturally significant buildings and relics
- ▶ question marks over the impacts the dam will have on faults and seismicity in the area
- ▶ the limited lifespan of the reservoir as a result of siltation behind the dam wall. This silt would normally be carried downstream, eventually being deposited in the Yangtze Delta
- ▶ the impact on local biodiversity, including the Chinese river dolphin, Siberian crane and Yangtze sturgeon

The Three Gorges dam forms part of a system of water management called the South–North Water Diversion Project (Figures 7 and 8), designed to transfer water from the wetter south of the country to areas in the dry north, especially the parched north China plain south of Beijing.



Figure 7 The South–North water diversion project

Figure 8 The South–North Diversion Project factfile

Cost	Projected to exceed \$60 billion
Key statistics	Eastern route is 1,200 km long, with 23 pumping stations and 9 km of tunnels Central route is 1,300 km long The last stage, the western route, is the most difficult to construct
Purpose	To divert up to 45 billion m ³ of water annually, by linking China's main rivers into one system
Completion	The whole system by 2050, eastern and central arms possibly by 2030
Relocation	Up to 400,000 people, depending on the exact routes chosen

Myanmar, Thailand, Laos, Cambodia, and Vietnam have all expressed concern that the western route will divert water from the headwaters of the rivers they rely on for water supply – principally the Mekong and Brahmaputra.

While the South–North Diversion could benefit up to 300 million people, there are concerns that large-scale water diversion will have significant environmental and ecological impacts:

- It is possible that diversion of water from the Yangtze might cause it to run dry during some parts of the year.
- It is possible that ecosystems could change as previously separate river systems are linked.
- More water in the north could lead to more wasteful use, more industrial development and more pollution.

Views on water supply and water management

The survival of the Chinese nation is threatened by the country's shortage of water.

(A statement by Wen Jiabao, Prime Minister of China in January 1999)

In recent years economic and social development has led to increasing water demand, and with the impact of global warming, drought and water scarcity are increasingly grave.

(Quote from a Chinese State Council directive issued in 2007)

About 360 of China's 600 cities are facing water shortages, over 100 of them severe shortages. Dependency on non-renewable groundwater is a primary cause.

(Report in *China Daily* on 6 October 2003 quoting the China Institute for Geo-Environment Monitoring)

In the north the Yellow River has been so over-exploited that it fails to reach the ocean for most of the year. Further south the Huaihe, considered the country's most polluted river, is frequently linked to the declining health of local residents. Even the Yangtze, which supplies water to a 12th of the world's population, is showing the growing pressure of dams, river traffic and effluent from supercities such as Chongqing, which has a municipal population of 30 million. Less than a third of the waste from China's cities is treated.

(Extract from *Guardian* article '100 Chinese cities face water crisis' by Jonathan Watts, 8 June 2005)

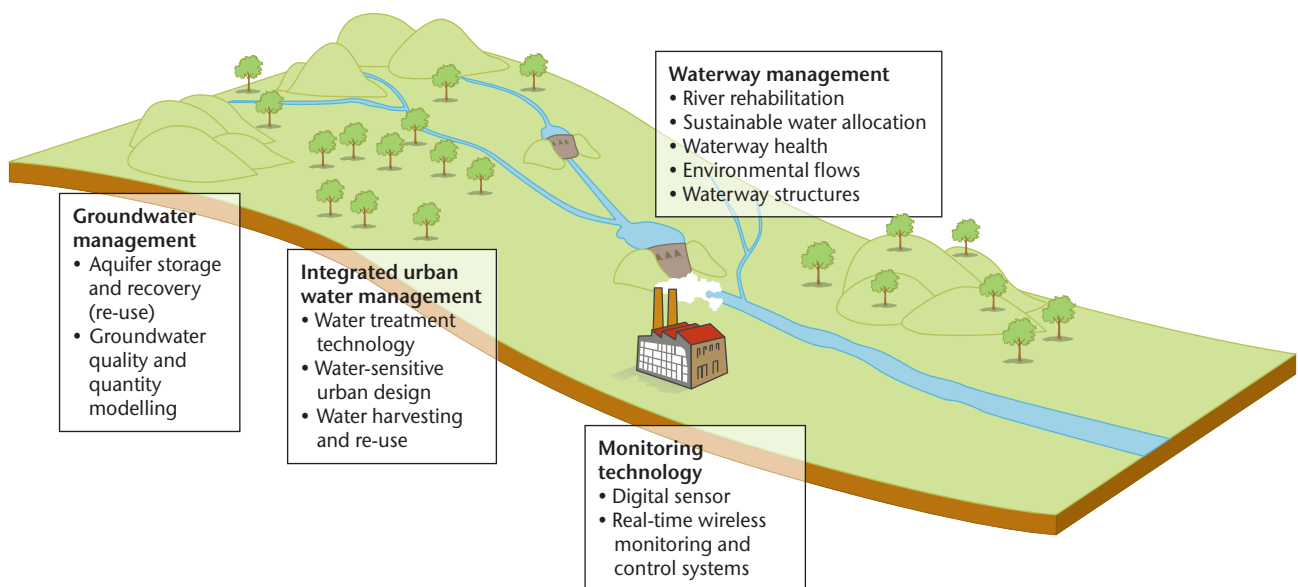


Figure 9 Sustainable management of water resources

The Ministry of Water Resources reported earlier this year that less than half of the nation's surface water is potable as a result of pollution, and 35 percent of its ground water has been rendered undrinkable. The Yangtze river is home to critically endangered wildlife, including the Yangtze River Dolphin, or Baiji, the world's most endangered cetacean and one of the 12 most endangered species in the world. About 24 billion tons of effluent is pumped into the Yangtze annually. Lakes and wetlands along its length have receded owing to rapid urbanization and the reclamation of marshlands, while schistosomiasis, or snail fever, has reached epidemic proportions in many areas.

(Extract from Xinhua news agency article, china.org.cn, 6 April 2005)

Most (55%) of the water from the Western Routes would be intended to develop an irrigated area of about 2 million hectares in western China. The remaining 9 km³ would go to supply urban and industrial uses. Economically, the benefits accrue overwhelmingly to industrial and urban users. Of a projected 30 billion yuan per annum in benefits, 27.7 billion yuan would go to these sectors, 2 billion yuan to irrigation, and nearly 0.5 billion yuan to flood protection. These figures may refer specifically to the Middle Route, but if so, are likely to be of similar proportions for the Eastern Route as well.

(Extract from 'The Status of the South to North Water Transfer Plans in China', a report for the UNDP, 2007)

Huang Lixin, director of the water resources bureau of Jiangsu Province, said the south-north water diversion will basically solve the severe water shortage in north China. In this way, the ecological environment will be remarkably improved and the country will more easily maintain sustainable social and economic development. An analysis offered by the water resources bureau shows that once the initial phases of the eastern and central diversion lines are completed, they will

bring an increased annual direct economic return of 55.3 billion yuan. Huang also urged that despite the water transfer project, people should still economise on water to avoid investment and water resources waste.

(Extract from the website of the Chinese embassy in the USA, 2002)

Southern water is plentiful, northern water scarce. Borrowing some water would be good.

(Mao Zedong, 1952)

Internet research resources

These websites represent a range of opinions and views on global water supply and Chinese water management:

www.unesco.org/water/wwap is the website of the UN World Water Assessment Programme (WWAP). It monitors world water use and major water supply issues. Its overall goal is sustainable water use.

www.bbc.co.uk – the BBC is a public service news broadcaster. Its news stories are archived and searchable.

www.chinadaily.com.cn is the website of a state-run English-language newspaper in China.

www.internationalrivers.org – International Rivers is an NGO that aims to protect rivers for the benefit of people who use them.

www.worldwatch.org – the Worldwatch Institute is a globally focused environmental research organisation based in Washington, DC. It has a special focus on China.

www.pbs.org – PBS is a US-based not-for-profit media group. It has a number of online resources on China, including an 'Inside China' section at **www.pbs.org/kqed/chinainside**

Unit 3

Questions and answers

Section A

Question 1

Study Figure 1.

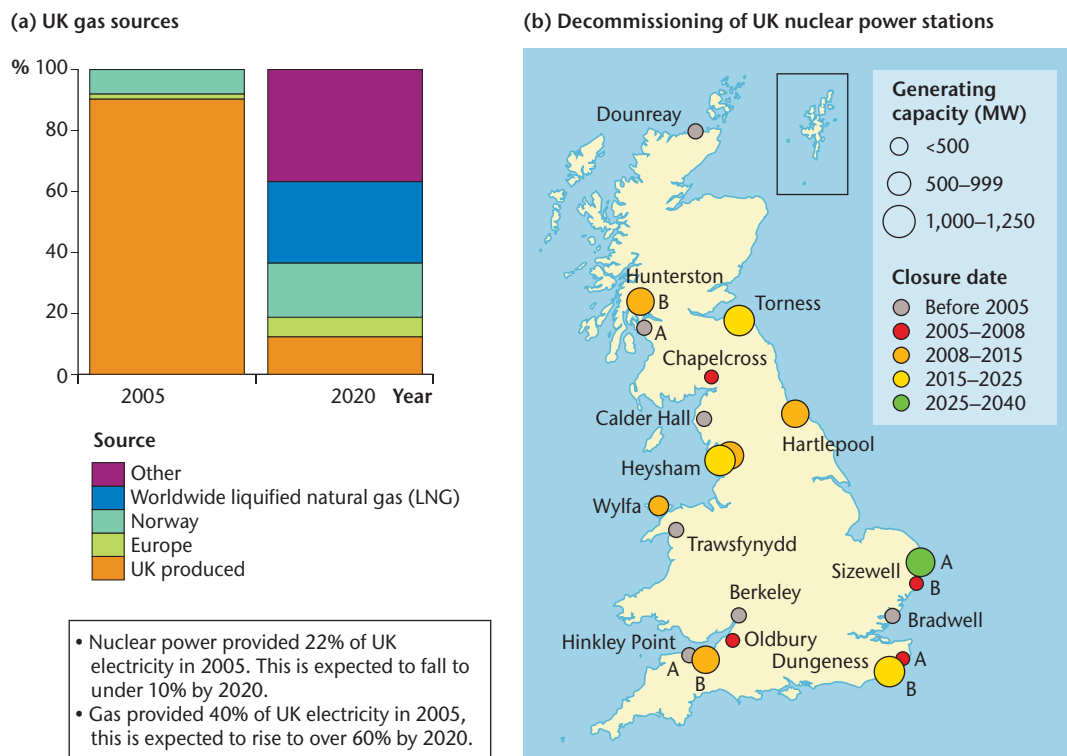


Figure 1 Changes in the UK's generation of electricity by gas-fired and nuclear power stations, 2005–40

1 a Explain how the data in Figure 1 might suggest that the UK's future could be one of increasing energy insecurity. (10 marks)

- UK gas production provided about 90% of supply in 2000. This is expected to fall to 12% by 2020, thus increasing dependency on imports.
- Some import sources, such as Norway, are 'stable'; others, such as middle eastern countries and Russia, may not be.
- Imports of gas could be very vulnerable to price rises, and to supply problems caused by conflict, terrorism or political difficulties, for example, the UK's sometimes strained relationship with Russia. LNG is transported by ship and is vulnerable to conflict and the closing of key shipping routes, such as Suez and the Hormuz Strait.
- This vulnerability is compounded by the expected increased dependency on gas, which is expected to generate up to 60% of the UK's electricity by 2020.
- This predicted gas dependency is related to the nuclear power map.
- All but one (Sizewell) of the UK's nuclear power stations will be closed by 2025. This explains the need to use gas to fill the gap, and this gas will need to be imported.
- It is unlikely that new nuclear stations could be built quickly enough to prevent a sharp decline in nuclear capacity.

- Overall, the UK's energy 'mix' is narrowing over the time period shown, increasing the risks of supplies being interrupted.
- Other issues, not directly included in the resource, such as imported oil or the fact that renewables (wind) could be used to increase security, could be mentioned and would be credited.

Note: The resource, Figure 1, is actually several resources (gas graph, nuclear map, text). Make sure reference is made to all of them in an answer, not just one part.

Assessment

Level 1 (1–4 marks) Some patchy, descriptive use of Figure 1 in an unstructured account. Limited understanding of energy insecurity. Explanations are oversimplified and lack clarity. Geographical terminology is rarely used with accuracy. There are frequent grammar, punctuation and spelling errors.

Level 2 (5–7 marks) Sound understanding of insecurity and partly balanced use of Figure 1. Shows some structure and raises a range of issues. Explanations are clear, but there are areas of less clarity. Lacks full range. Geographical terminology is used with some accuracy. There are some grammar, punctuation and spelling errors.

Level 3 (8–10 marks) Structured response, with detailed use of the figure, and goes beyond this. Range of explanations linked to energy insecurity, which may be defined. At the top end, may argue against the premise. Explanations are always clear. Geographical terminology is used with accuracy. Grammar, punctuation and spelling errors are rare.

1 b Evaluate the economic and environmental impacts of growing global energy demand. (15 marks)

- The growth in global energy demand is particularly strong in the BRIC countries. In the developing world, energy demand is relatively stable.
- The answer to this question could be structured around a grid, as shown below.

Impacts	Negative impacts	Positive impacts
Economic	Possible price rises as demand soars; energy poverty rises (10%+ of income spent on energy) The wealthy may 'outbid' the poor to ensure supply	There are winners, e.g. major oil and gas TNCs such as BP; tax take may rise Some resource-rich developing countries (Sudan, Nigeria) may benefit (they may also be exploited) Increased energy use is linked to development and improving health, e.g. India
Environmental	Increased exploitation in fragile areas such as the Arctic and US continental shelf, leading to biodiversity loss The direct impact of increased carbon emissions on global warming	With high prices, renewable non-polluting sources (e.g. wind power) may become economic, reducing carbon emissions High prices may reduce demand and therefore pollution

- Note that some of the possible impacts are not certain, for example the impact on carbon emissions.
- It might be argued that some impacts are 'worse than others', for example, increasing fuel poverty or the irreversible environmental degradation of some fragile areas such as the Arctic.

Note: Remember that 'impacts' can be both positive and negative, as can 'effects' and 'consequences'. Students often see only the negative side.

Assessment

Level 1 (1–4 marks) Generalised impacts only, likely to be unbalanced (negative) and a narrow range (soaring costs). No evaluation. Explanations are oversimplified and lack clarity. Geographical terminology is rarely used with accuracy. There are frequent grammar, punctuation and spelling errors.

Level 2 (5–8 marks) Some range of impacts, both environmental and economic, are present but unbalanced in terms of positive and negative; some structure but generalised. Explanations are clear, but there are areas of less clarity. Geographical terminology is used with some accuracy. There are some grammar, punctuation and spelling errors.

Level 3 (9–12 marks) Range of impacts, both environmental and economic, considered. Structured with a fairly balanced consideration of positive and negative impacts. Examples and places are likely to be used; some evaluation. Explanations are always clear. Geographical terminology is used with accuracy. Grammar, punctuation and spelling errors are rare.

Level 4 (13–15 marks) Structured evaluation of a range of economic and environmental, positive and negative impacts. Uses places and examples to illustrate points. Likely to provide an overview. Explanations are always clear. Geographical terminology is used with accuracy. Grammar, punctuation and spelling errors are very rare.

Question 2

Study Figure 2.

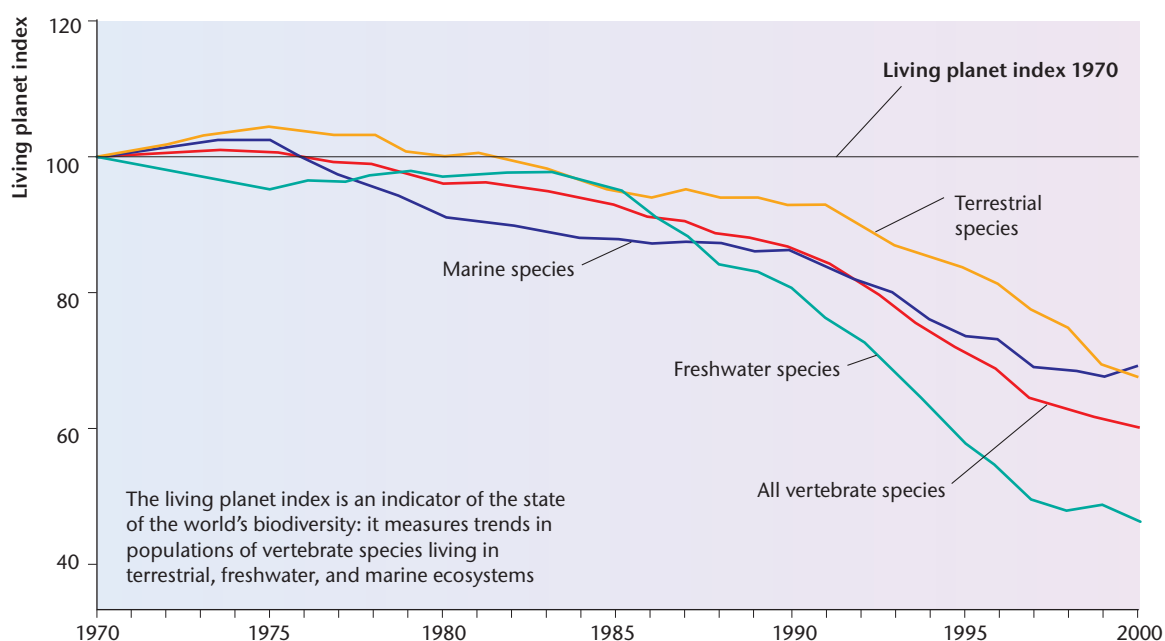


Figure 2 The living planet index, 1970–2000

2 a Suggest reasons for the trends in the living planet index shown in Figure 2. (10 marks)

- Overall the living planet index (LPI) has declined from 100 in 1970 to 60 in 2000, with freshwater species worse off (down to 48) and marine and terrestrial species slightly better off (only down to 68–70).
- A range of threats have degraded ecosystems in which vertebrate species live.
- Globally, climate change and pollution can be said to be an overall contributory stress factor.
- LPI for terrestrial species rose in the 1970s, perhaps as a result of conservation and management measures.
- All the LPI graph lines show a steep decline after 1990 – possibly the result of rising resource exploitation in the NICs and BRICs. This levelled off in the late 1990s, possibly as a result of increased conservation efforts targeted at key species and 'hotspots'.
- Marine decline might be attributed to overfishing, exploitation of coral reefs and widespread pollution of the continental shelf.

- Terrestrial decline might result from deforestation, conversion of ecosystems to farmland, and desertification.
- Freshwater decline is caused by water pollution and interference with rivers as a result of water management.

Note: Be careful when a question asks for 'trends'. In Figure 2 the plots of the four indicators are broadly similar and the general trend is downward. However, there are significant variations and differences in steepness, rises and slight recoveries. Avoid simply taking an overview: some detail is needed.

Assessment

Level 1 (1–4 marks) Lacks structure, and likely to take the overall decline as the only trend. Gives a few general reasons relating to exploitation; undifferentiated. Explanations are oversimplified and lack clarity. Geographical terminology is rarely used with accuracy. There are frequent grammar, punctuation and spelling errors.

Level 2 (5–7 marks) Some structure and more than one trend explained. May lack balance in consideration of the four indicators. Some reasons are given, mainly linked to generic processes and threats. Explanations are of variable clarity. Lacks full range. Geographical terminology is used with some accuracy. There are some grammar, punctuation and spelling errors.

Level 3 (8–10 marks) Structured. Recognises some subtleties in the trends and explains these. Is likely to refer to named places/examples to illustrate. A range of reasons is given. Explanations are always clear. Geographical terminology is used with accuracy. Grammar, punctuation and spelling errors are rare.

2 b With reference to examples, assess the relative importance of physical and human factors in influencing biodiversity. (15 marks)

- Biodiversity is influenced by both physical and human factors. Physical factors determine natural biodiversity, whereas human factors can be either positive or negative.
- Biodiversity is highest in areas where climate allows almost continuous growth and reproduction throughout the year, for example in tropical forests and coral reefs.
- Variations in climate, soils and water budgets over short distances (as in mountains) can create a large range of ecological niches and high biodiversity.
- Endemism is important, for instance on isolated islands such as the Galapagos.
- People often reduce biodiversity through specific threats (deforestation, overfishing, etc.) or through more general stress (global warming).
- People may also increase biodiversity in areas previously degraded by careful management, as in the restoration of ecosystems. The St Lucia SMMA provides a useful example.
- Physical factors are required to create biodiversity. For this reason, they may be seen as relatively more important in the long term. In the short term, people have a key role to play in maintaining biodiversity.

Note: The phrase 'relative importance' requires weighing up several factors and making a judgement as to which is the most important.

Assessment

Level 1 (1–4 marks) Unclear on biodiversity and will lack depth when dealing with physical factors. Likely to focus on generalised human threats. No assessment. Explanations are oversimplified and lack clarity. Geographical terminology is rarely used with accuracy. There are frequent grammar, punctuation and spelling errors.

Level 2 (5–8 marks) Has some ideas on biodiversity and mentions human and physical factors, but unbalanced. Examples are of the named place variety with little detail, and the range of factors is narrow. Lacks assessment. Explanations are clear, but there are areas of less clarity. Geographical terminology is used with some accuracy. There are some grammar, punctuation and spelling errors.

Level 3 (9–12 marks) Some structure, and covers both human and physical factors, but may be unbalanced. Some examples with some details. Does assess importance. Explanations are always clear. Geographical terminology is used with accuracy. Grammar, punctuation and spelling errors are rare.

Level 4 (13–15 marks) Structured and detailed account with reference to examples. Human and physical factors covered in a balanced way with clear reference to their relative importance. Explanations are always clear. Geographical terminology is used with accuracy. Grammar, punctuation and spelling errors are very rare.

Question 3

Study Figure 3.

Figure 3 Annual military spending and economic growth in a sample of countries, 1987–2007

	1987 military spending (billions of constant US\$)	Collapse of the USSR and eastern European communist states 1989–91	2007 military spending (billions of constant US\$)	Total GDP growth 1987–2007
USA	483		546	+65%
UK	62		59	+45%
Russia	218 (USSR)		35	+140%
India	12		24	+140%
China	12		58	+330%

3 a Using Figure 3 and your own knowledge, comment on the superpower status of the countries shown. (10 marks)

- The five countries might be seen as a collection of superpowers, emerging superpowers and declining superpowers.
- The USA is the dominant global economic and military superpower. Despite the 'peace dividend', it has raised military spending. It shows strong economic growth, but the performance is not as good as that of China and Russia. It is politically and culturally dominant, and its TNCs dominate world trade.
- The UK might be viewed as 'on the wane', with the weakest economic performance and a falling military influence. On the other hand, it could be viewed as part of the EU superpower.
- The other three countries are emerging powers. China is perhaps the strongest, showing a huge increase in economic strength and a significant move to increase its military power to the levels of the UK. Its roles in global manufacturing and trade are very important. The same trends are also to be seen to a lesser extent in India. Both countries are population superpowers.
- Russia is a complex case. It has declined in military power but grown significantly in economic strength, thanks largely to its oil and gas reserves.

Note: This question asks for 'your own knowledge'. In order to access the top level in the marks scheme, it is vital to introduce into the answer information which is not in Figure 3.

Assessment

Level 1 (1–4 marks) Basic comments, with a narrow focus on what is given in Figure 3. May focus on one or two countries only; does not differentiate between types of superpowers. Explanations are oversimplified and lack clarity. Geographical terminology is rarely used with accuracy. There are frequent grammar, punctuation and spelling errors.

Level 2 (5–7 marks) Some structure, and covers most countries, but in variable detail. Does recognise different types of power. At the top end, uses some own knowledge to support comments. Explanations are clear, but there are areas of less clarity. Lacks full range. Geographical terminology is used with some accuracy. There are some grammar, punctuation and spelling errors.

Level 3 (8–10 marks) Structured discussion across the range of countries; uses Figure 3 and own knowledge to good effect. Recognises different types of power and superpowers. Explanations are always clear. Geographical terminology is used with accuracy. Grammar, punctuation and spelling errors are rare.

3 b Assess the environmental and social implications of the rise of the BRICs. (15 marks)

- The BRICs are Brazil, Russia, India and China. There is no need to refer to each one in detail, but some reference to individual countries is desirable.
- The environmental implications are mostly negative, with increases in resource exploitation and consumption leading to increases in pollution.
- This increased pollution has a global impact (global warming) as well as local impacts (for example, Harbin in China, oil exploitation in the Siberian tundra, the Asian 'brown cloud'). There may be some more positive environmental signs, as in the cultivation of biofuels in Brazil.
- The major social impacts are largely related to urbanisation and the emergent megacities. Slums are the most obvious manifestation of this in all four countries.
- In general, people have benefited from economic growth and its associated reduction in poverty. But there are still losers who fail to benefit from the growth, particularly the rural poor in China and India. At the same time, there has been a concentration of wealth, as for example in the hands of Russian oligarchs.
- In all countries, the middle class has grown and this in turn has led to a rise in consumerism. This often has positive social effects, such as the improvement of healthcare. But there are also negative impacts on health through obesity, urban sprawl and the general strain on resources such as water. Increases in freedom and democracy have occurred in some of the countries.

Note: Focusing on only one of the BRIC countries will tend to peg answers at Level 2 in the mark scheme.

Assessment

Level 1 (1–4 marks) Writes in terms of generalised impacts; unclear about the distinction between social and environmental impacts. Not well linked to named BRICs and lacking depth. May discuss global warming. Explanations are oversimplified and lack clarity. Geographical terminology is rarely used with accuracy. There are frequent grammar, punctuation and spelling errors.

Level 2 (5–8 marks) Some range of impacts considered, but in a rather variable way. May be unbalanced in its treatment of social and environment impacts or focus on one BRIC only. Explanations are clear, but there are areas of less clarity. Limited assessment. Geographical terminology is used with some accuracy. There are some grammar, punctuation and spelling errors.

Level 3 (9–12 marks) Some structure in an account which contains some detail and covers a range of both social and economic implications. Some supporting evidence and attempt to assess. Explanations are always clear. Geographical terminology is used with accuracy. Grammar, punctuation and spelling errors are rare.

Level 4 (13–15 marks) Structured, detailed account which refers to a range of social and environmental implications, likely to be well supported. Does assess the implications and likely to comment on their relative importance. Explanations are always clear. Geographical terminology is used with accuracy. Grammar, punctuation and spelling errors are very rare.

Question 4

Study Figure 4.

MDG	India	Brazil	Egypt	Bangladesh
1 Eradicate extreme poverty and hunger	○	●	◐	○
2 Achieve universal primary education	○	●	◐	◐
3 Promote gender equality and empower women	○	●	○	●
4 Reduce child mortality	⊖	◐	◐	○
5 Improve maternal health	○	◐	◐	○
6 Combat HIV/AIDS, malaria and other diseases	⊖	●	◐	○

- MDG reached by 2007
 ◐ MDG likely to be reached by 2015
 ○ MDG not likely to be reached by 2015
 ⊖ Not enough data

Figure 4 Progress towards selected Millennium Development Goals in four countries

4 a Suggest reasons for the variable progress towards reaching the Millennium Development Goals shown in Figure 4. (10 marks)

- The four countries shown are at different levels of development. Economic prosperity and the wealth to invest in making progress will be a big factor, as for example in Brazil.
- However, despite being a very poor LIC, Bangladesh has made some progress. Small-scale development projects, such as tubewells and microcredit, seem to have had a considerable impact.
- The scale of the problems, particularly its huge population, could be a reason why the wealth generated by economic growth in India is not trickling down through its society.
- Political will could be seen as crucial to pushing through the improvements needed.
- Help in the form of aid, or hindrance in the form of debt, might be important in allowing some countries to be more successful than others.
- Some specific measures, such as gender equality, might be held back by cultural values (as in Egypt) and taboos about diseases such as HIV/AIDS.
- A focus on some areas might lead to losing track of others, such as the lack of health progress in Bangladesh. Frequent hazards might create a one step forward, two steps back situation.
- Lack of data and the consequent lack of certainty about priorities and what needs to be done handicaps the tackling of problems.

Note: A table such as Figure 4 is quite complex. It is vital to stand back and look for patterns. Slavishly commenting on every aspect in detail should be avoided. Look for groupings and clusters.

Assessment

Level 1 (1–4 marks) Generalised and descriptive comments on progress. May have one or two narrow ideas relating to differences in wealth. Explanations are oversimplified and lack clarity. Geographical terminology is rarely used with accuracy. There are frequent grammar, punctuation and spelling errors.

Level 2 (5–7 marks) Some structure and a range of reasons are given. May be rather narrow but shows some details. Begins to look at individual goals and countries. Explanations are clear, but there are areas of less clarity. Lacks full range. Geographical terminology is used with some accuracy. There are some grammar, punctuation and spelling errors.

Level 3 (8–10 marks) Structured range of reasons linked to specific goals and country-specific explanations, which are always clear. Geographical terminology is used with accuracy. Grammar, punctuation and spelling errors are rare.

4 b Using examples, evaluate the role trade plays in the development gap. (15 marks)

- Trade can be seen as being both positive and negative in the context of the development gap.
- Free trade might be seen as a key reason for the reduction in poverty, as in China, because it helps people to gain employment and a stable income from globalisation.
- Developing nations might be viewed as pawns in the trade game; for example cotton subsidies in Mali and the banana wars.
- Trade might also be seen as unfair and exploitative, especially for countries relying on producing primary commodities for export.
- Fair trade might be seen as a positive step in allowing areas (for example, coffee- and cocoa-growing areas) to benefit from trade but not be exploited by it.
- There is some room for other factors, such as aid and debt, to be mentioned as important components of the trade formula.

Note: Be wary of questions which tempt candidates to be one-sided. Such questions can easily encourage an ill-informed rant about the evils of trade rather than a more balanced view.

Assessment

Level 1 (1–4 marks) Narrow, with a few generalised points about the evils of free trade or similar. Explanations are oversimplified and lack clarity. Geographical terminology is rarely used with accuracy. There are frequent grammar, punctuation and spelling errors.

Level 2 (5–8 marks) There is a limited and unbalanced discussion of trade, with few if any examples. Explanations are clear, but there are areas of less clarity. Geographical terminology is used with some accuracy. There are some grammar, punctuation and spelling errors.

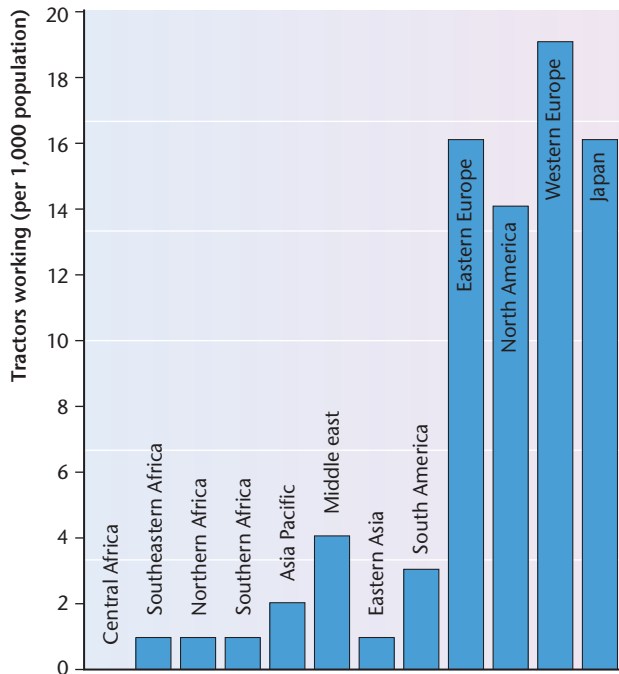
Level 3 (9–12 marks) Some structure. Recognises different types of trade and that the role of trade is a complex one. Some examples used, and there is some evaluation. Explanations are always clear. Geographical terminology is used with accuracy. Grammar, punctuation and spelling errors are rare.

Level 4 (13–15 marks) A structured and detailed account which uses examples. Recognises the complex role and different types of trade. Evaluative and balanced. Explanations are always clear. Geographical terminology is used with accuracy. Grammar, punctuation and spelling errors are very rare.

Question 5

Study Figure 5.

(a) Working tractors



(b) Personal computers

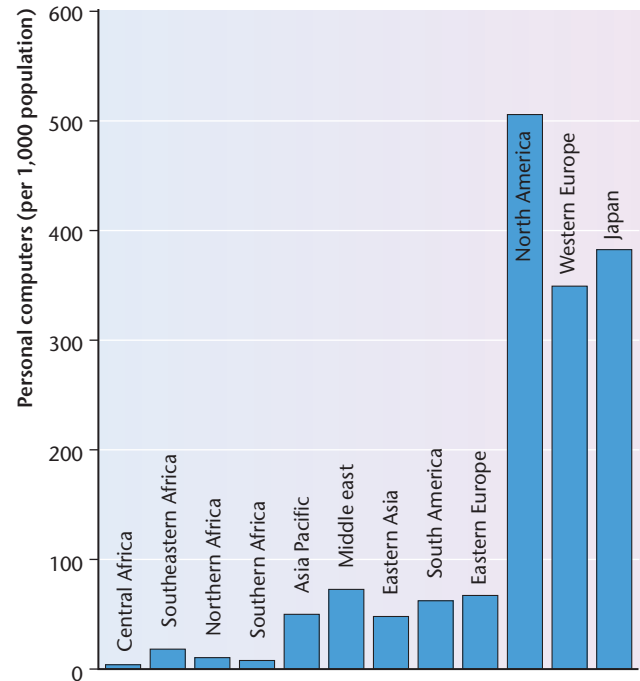


Figure 5 Access to two technologies by global region, 2002

5 a Suggest factors which might explain the level of access to technology such as that shown in Figure 5. (10 marks)

- Cost is a possible barrier, with PCs an expensive item for individuals and tractors costly for farmers, especially in LDC regions such as central Africa. There are direct costs and indirect costs (fuel, maintenance).
- There may be a lack of infrastructure to support technology such as PCs. For example, interrupted electricity supply, and internet service providers restricting access.
- As education levels in general are lower in the developing world, this may prove a barrier to the adoption of technology.
- In some countries, there could be political barriers to some technologies, as for example to computers in North Korea, or cultural barriers, such as to the adoption of tractors by the Amish.
- The level of technology might play a part. The basic tractor is common in eastern Europe whereas the high-tech PC is not. Also the type of technology is relevant. Tractors might simply not be useful on many farms in southeast Asia.
- The data indicate both high and low access, and that access rapidly increases at a certain level of development. Governments may be more prepared to invest in technology in some locations than in others.
- There is room to bring in other technologies, such as medicines, as well as other arguments such as the patent system preventing access to some new technologies.

Note: As these questions are data-based, it is vital to refer to specific information given in Figure 5. However, having done this, efforts should be made to introduce additional relevant information and examples. Provided it is relevant, such 'external' information will gain considerable credit.

Assessment

Level 1 (1–4 marks) Some reference to Figure 5 but of a descriptive nature. Unlikely to move much beyond cost/development level as a reason. Explanations are oversimplified and lack clarity. Geographical terminology is rarely used with accuracy. There are frequent grammar, punctuation and spelling errors.

Level 2 (5–7 marks) Explanations are clear, but there are areas of less clarity. Lacks full range but does identify some factors. Geographical terminology is used with some accuracy. There are some grammar, punctuation and spelling errors.

Level 3 (8–10 marks) Structured answer dealing with a range of factors linked to the figure and possibly other technologies. Explanations are always clear. Geographical terminology is used with accuracy. Grammar, punctuation and spelling errors are rare.

5 b Using named examples, assess the impacts on people and the environment of both high-tech and intermediate technology development projects. (15 marks)

- The table below provides a structure for the response, although the details depend on the examples chosen.
- A wide range of examples could be used. For high-tech, they are likely to be large-scale, top-down schemes such as the Three Gorges dam or GM crops. Some small-scale schemes are high-tech, such as the Grameen phone; others are diffuse but to some degree top-down, such as One Laptop Per Child.
- Many intermediate technology schemes are the work of NGOs such as Practical Action. Pumpkin tanks, micro-hydro and Jiko stoves are good examples.
- Assessment might include an overview of which approach seems best in terms of maximising positive impacts and minimising negative ones.

	Impacts on people	Impacts on environment
High technology	<ul style="list-style-type: none"> – May be top-down, with people not fully involved, as technology provides a barrier – Could increase dependency on others for maintenance and ongoing costs (which could be high) –/+ There could be winners and losers, as when reservoir flooding causes migration + May have the potential to benefit a large number of people quickly 	<ul style="list-style-type: none"> – Could pollute if non-renewable or resource-heavy – Potential loss of land or impact on ecosystems and natural areas + Could replace older, outdated and more polluting technology –/+ Some high-tech schemes might allow easier exploitation of resources, increasing wealth but degrading the environment
Intermediate technology	<ul style="list-style-type: none"> + People may have some say in which technology is used + May be provided with training and skills to maintain it – The footprint could be small, with only small numbers benefiting – It may only meet basic needs, rather than allow wider development 	<ul style="list-style-type: none"> + Likely to have a lower footprint, and many schemes are designed to be ecofriendly and renewable

Note: Examples need to be as specific as possible, such as ‘the Three Gorges HEP and navigation dam in China’, rather than more generalised, such as ‘large dams in LEDCs’.

Assessment

Level 1 (1–4 marks) Basic ideas of a generalised nature. May cover a few negative impacts of large schemes. No real reference to technology. Explanations are oversimplified and lack clarity. Geographical terminology is rarely used with accuracy. There are frequent grammar, punctuation and spelling errors.

Level 2 (5–8 marks) Some examples and some structure. May compare two schemes but lacks a clear link to technology. No assessment. Explanations are clear, but there are areas of less clarity. Geographical terminology is used with some accuracy. There are some grammar, punctuation and spelling errors.

Level 3 (9–12 marks) Some structure and details of schemes using different levels of technology; impacts clearly stated but a little unbalanced. Implied assessment. Explanations are always clear. Geographical terminology is used with accuracy. Grammar, punctuation and spelling errors are rare.

Level 4 (13–15 marks) Structured account with details of schemes which contrast in terms of technology level; detailed assessment of +/– impacts. Explanations are always clear. Geographical terminology is used with accuracy. Grammar, punctuation and spelling errors are very rare.

Unit 3

Questions and answers

Section B

Question 6

6 a Explain the factors which have contributed to China's water crisis. (12 marks)

- The factors might be grouped into physical and human, or social, economic and environmental. Good candidates would be expected to do this.
- Physical factors include low rainfall, especially in the north China plain, accompanied by periodic droughts. In addition, climate change seems to be affecting runoff from the Himalayan plateau area, reducing river discharge. There is room to research climate change in China in more depth, and such detail might be included here.
- Human factors include economic growth in the north, leading to a soaring demand for, and shrinking supply of, water. Urbanisation and the growth of megacities have been major contributors to this situation.
- Industrialisation, fuelled by globalisation, has led to much of the water available being polluted. Lack of management has compounded this problem. In addition, industrial use of water is highly inefficient and wasteful.
- Some water resource use is illegal and hard to manage. This has contributed to falling groundwater levels and the progressive loss of a once renewable resource.
- Political factors also play a role, such as lack of management, a policy of keeping water prices artificially low, and possibly the secrecy of the communist regime, which prevents people from speaking out.

Synoptic linkages:

- There are links to climate change from AS Unit 1.
- There are links to the World cities part of Unit 1.
- There are links to the Pollution and human health at risk option in Unit 4.
- There are numerous links to the Unit 3 topic Water conflicts. It is important that you use key terminology from this unit.
- China's drive to become a superpower (Unit 3) has resulted in a seemingly wasteful approach to water, putting economic growth before environmental sustainability.
- Some of the issues facing China are similar to those facing the southeast of England, Spain and other countries where water stress is rising.

Note: This opening question is broad and designed to encourage students to take an overview of the issue. A wide range of factors should be considered, and too narrow a focus avoided.

Assessment

Level 1 (1–4 marks) Structure is poor or absent. A few factors are considered but there is no attempt to organise these. Some details taken from the resources, but patchy. No synoptic linkages. Explanations are oversimplified and lack clarity. Geographical terminology is rarely used with accuracy. There are frequent grammar, punctuation and spelling errors.

Level 2 (5–8 marks) Structure is satisfactory. Logical order with some attempt to group. Range of factors identified, with some details; occasional reference to wider linkages but not in depth. Geographical terminology is used with some accuracy. There are some grammar, punctuation and spelling errors.

Level 3 (9–12 marks) Structure is good. A full range of factors are identified in detail and ordered/grouped logically. Effective use of the resources and synoptic links. May begin to evaluate relative importance. Explanations are always clear. Geographical terminology is used with accuracy. Grammar, punctuation and spelling errors are rare.

6 b Evaluate the possible impacts of China's large-scale water management schemes on people and the environment. (16 marks)

- Three schemes are mentioned in the resources: desalination, the Three Gorges dam and the South–North water transfer. All need to be covered.
- Remember that impacts can be both positive and negative, and there should be a balanced consideration of both. Similarly the impacts both on people and the environment need to be addressed.
- Be careful not to 'force' an impact for the sake of perfect balance. There may not be a positive environmental impact.
- Desalination plants use huge amounts of power, possibly offsetting the carbon gains that the Three Gorges dam reportedly offers. Marine ecology could be affected. The water supply could be seen as infinite.
- There is a range of impacts on biodiversity and endangered species resulting from the Three Gorges dam, plus significant disruption to people through resettlement and loss of community and heritage. There are also 'unknowns', such as earthquake risks. On the positive side, flood risks may be reduced, if not eliminated. The energy produced is clean and there could be social benefits resulting from the development of the Chinese interior.
- The water transfer scheme is more of an unknown quantity. It could bring security of water supply to millions, and alleviate drought and water shortage. The environmental impacts are not clear, but might involve problems being caused by species migrating from one ecosystem to another.
- There are other schemes which might be used as parallel examples to add depth. Examples include the Aswan and Akasombo dams, both with significant downstream impacts which are hinted at in the resources. Both the Colorado River and the Ebro are subject to large-scale water transfers, and many rivers are involved in transboundary conflicts.

Synoptic linkages:

- Many links to aspects of Water conflicts and the opportunity to use parallel examples.
- There are links to Biodiversity under threat, such as the impact on species.
- All of the schemes are technological fixes of the top-down, high-tech variety, explored in Unit 3.
- The HEP element of the Three Gorges Dam links to Energy security from Unit 3.
- The schemes bring development, but it is of a particular type, i.e. government-led and capital-intensive (Bridging the development gap).

Note: The crucial part of this question is the evaluation. Good candidates will be expected to 'judge' which impacts are the most important.

Assessment

Level 1 (1–4 marks) Structure is poor or absent. Unbalanced focus on one scheme. Impacts are generalised. Limited use of resources. Negative view. Explanations are oversimplified and lack clarity. Geographical terminology is rarely used with accuracy. There are frequent grammar, punctuation and spelling errors.

Level 2 (5–8 marks) Structure is satisfactory. Several schemes mentioned, but treatment unbalanced. Impacts on people and environment are present. Some use of resources, but patchy details. Descriptive. Mostly negative. Explanations are clear, but there are areas of less clarity. Geographical terminology is used with some accuracy. There are some grammar, punctuation and spelling errors.

Level 3 (9–12 marks) Structure is good. All schemes are covered with reasonable balance. Impacts on people and environment are clearly stated, and both positive and negative recognised. Good use of the resources and some details. Some evaluation is present and there are some wider linkages. Explanations are always clear. Geographical terminology is used with accuracy. Grammar, punctuation and spelling errors are rare.

Level 4 (13–16 marks) Carefully structured. Balanced coverage of the three schemes. Impacts on people and environment are covered in a balanced way, and both positive and negative recognised. Careful use of the resources

in depth. Detailed evaluation and synoptic links. Explanations are always clear. Geographical terminology is used with accuracy. Grammar, punctuation and spelling errors are very rare.

6 c Suggest ways in which China could balance the desire to develop with a more sustainable use of water resources. (12 marks)

- It would be useful to start by clarifying the meaning of 'sustainable', using the Brundtland definition, or the sustainability stool or quadrant. This would provide the answer with a firm foundation and structure.
- China's development is well known, and this could be briefly discussed. The question is driving at the tension between sustainability and the need to develop, i.e. environment vs economy.
- The issue of low water cost could be addressed by raising prices, although this might be disliked. It might lead to more efficient use. Rationing is an option but usually only temporary. Eco-cities, such as Dongtan, are being designed to use less water.
- Pollution and sewage clearly need to be cleaned up, possibly using a 'polluter pays' tax or a system of heavy fines.
- It could be argued that a much more vigorous monitoring system is needed to assess water resources and fit the supply to the demand, to prevent depletion of groundwater. Wider planning might be used to avoid development in areas of known shortage.
- Smaller-scale, local schemes might be used, such as rainwater harvesting and pumpkin tanks. Agriculture could be adapted to suit the low water supply, for instance by using GM/drought-tolerant crops.
- Some wetland and river restoration could be used to enhance natural storage, reduce flood risk and restore biodiversity.

Synoptic linkages:

- Management options from the Water conflicts part of Unit 3.
- Small-scale, locally controlled or intermediate technology water schemes from Bridging the development gap or The technological fix?
- From Unit 1, the Global challenges for the future and Sustainable megacities topics are relevant.

Note: This is a more 'open' question. There is some information in Figure 9 of the pre-release booklet but students are expected to use their own examples from Water conflicts and possibly Bridging the development gap to support their answer. This is where revision and research are essential.

Assessment

Level 1 (1–4 marks) Structure is poor or absent. A few general ideas, such as 'rationing', but lacks an understanding of sustainability. Also no clear link to development. Explanations are oversimplified and lack clarity. Geographical terminology is rarely used with accuracy. There are frequent grammar, punctuation and spelling errors.

Level 2 (5–8 marks) Structure is satisfactory. Some range of ideas which are partially linked to sustainability. Some detail, but variable; uses Figure 9. Partially addresses the issues of need for balance. Geographical terminology is used with some accuracy. There are some grammar, punctuation and spelling errors.

Level 3 (9–12 marks) Structure is good. Range of detailed ideas from Figure 9 and own knowledge; exemplified. Good understanding of sustainability and link to development. Explanations are always clear. Geographical terminology is used with accuracy. Grammar, punctuation and spelling errors are rare.