Write your name here

Surname	Other names

Centre Number | Candidate Number

Edexcel GCE

Geography

Advanced
Unit 3: Contested Planet

Wednesday 13 June 2012 – Afternoon
Time: 2 hours 30 minutes

Paper Reference
6GE03/01

You must have:
Resource Booklet (enclosed)

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer TWO questions in Section A and ALL parts of Section B.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*

Information

- The total mark for this paper is 90.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*
- The quality of your written communication will be assessed in ALL your responses
  – *you should take particular care on these questions with your spelling, punctuation and grammar, as well as the clarity of expression.*

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Spend approximately 80 minutes on Section A and 70 minutes on Section B.
- Check your answers if you have time at the end.

Turn over ▶

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P 3 9 9 4 0 A 0 1 3 2

PEARSON

SECTION A

Answer TWO questions in this section.

You are reminded of the need to use examples to support your arguments.

You are advised to spend approximately 80 minutes on Section A.

Energy Security

1 Study Figure 1.

(a) Explain the possible impacts on UK energy security of the trends shown.

(10)

(b) Using named examples, evaluate the contribution radical energy technologies and policies might make to a more sustainable energy future.

(15)

(Total for Question 1 = 25 marks)

Biodiversity under Threat

2 Study Figure 2.

(a) Suggest reasons for the trends in the health of the four groups shown.

(10)

(b) Using named examples, examine the relationship between levels of economic development and attitudes towards conservation of ecosystems.

(15)

(Total for Question 2 = 25 marks)

Superpower Geographies

3 Study Figure 3.

(a) Using Figure 3 and your own knowledge, explain why the pattern of economic power has changed over time.

(10)

(b) Using named examples, assess the relative importance of economic, military and cultural factors in influencing superpower status.

(15)

(Total for Question 3 = 25 marks)

Bridging the Development Gap

4 Study Figure 4.

(a) Suggest reasons for the variable progress towards achieving the Millennium Development Goal targets.

(10)

(b) Using named examples, assess the advantages and disadvantages of contrasting ways of measuring development.

(15)

(Total for Question 4 = 25 marks)

The Technological Fix?

5 Study Figure 5.

(a) Suggest reasons for trends in the use of technology in the developing world, such as those shown.

(10)

(b) Using named examples, evaluate the environmental and social costs of adopting new technologies.

(15)

(Total for Question 5 = 25 marks)

Put a cross in the box indicating the first question you have chosen to answer ☒.
If you change your mind, put a line through the box ☒
and then put a cross in another box ☒.
You will be asked to indicate your second question choice on page 11.

Chosen Question Number:

Question 1 ☒ **Question 2** ☒

Question 3 ☒ **Question 4** ☒

Question 5 ☒

(Total for Question = 25 marks)

Put a cross in the box indicating the second question you have chosen to answer ☒.
If you change your mind, put a line through the box ☒
and then put a cross in another box ☒.

Chosen Question Number:

Question 1 ☒ **Question 2** ☒

Question 3 ☒ **Question 4** ☒

Question 5 ☒

(Total for Question = 25 marks)

TOTAL FOR SECTION A = 50 MARKS

SECTION B

Answer ALL parts of this section, referring to the advance information you have been asked to study.

You are reminded of the need to use examples from any part of your GCE Geography course to support your answers.

You are advised to spend approximately 70 minutes on Section B.

Water Conflicts

6 (a) Explain how the physical and political geography of the region is putting water supply at risk.

(10)

(b) Assess the relative importance of the threats to **future** water supply within the region.

(15)

(c) Evaluate the contribution water management schemes, such as those shown in Figure 11, might make towards a **sustainable water future** for the region.

(15)

(Total for Question 6 = 40 marks)

(Total for Question 6 = 40 marks)

TOTAL FOR SECTION B = 40 MARKS
TOTAL FOR PAPER = 90 MARKS

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Do not return the Resource Booklet with the question paper.

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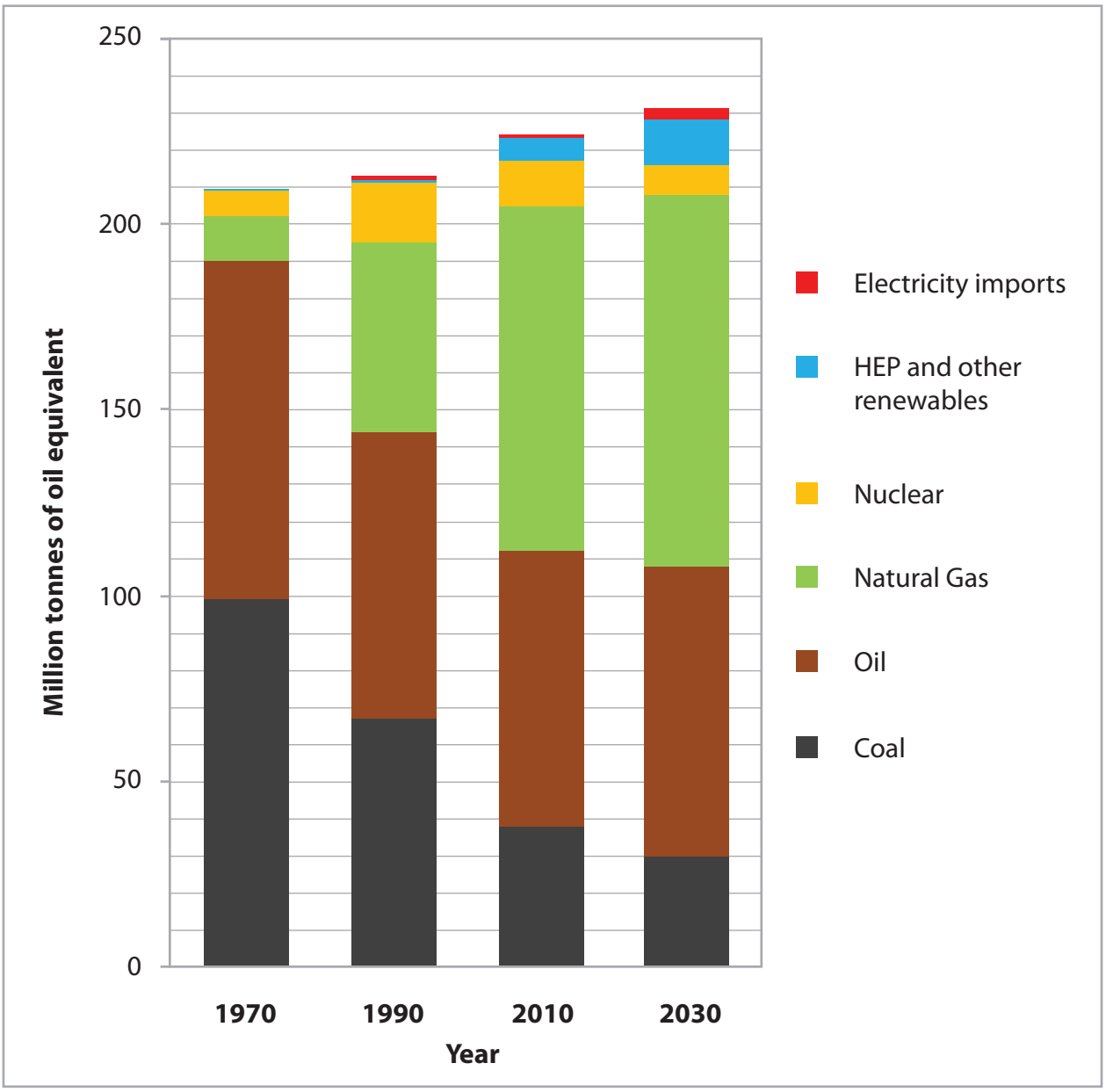
PEARSON

SECTION A

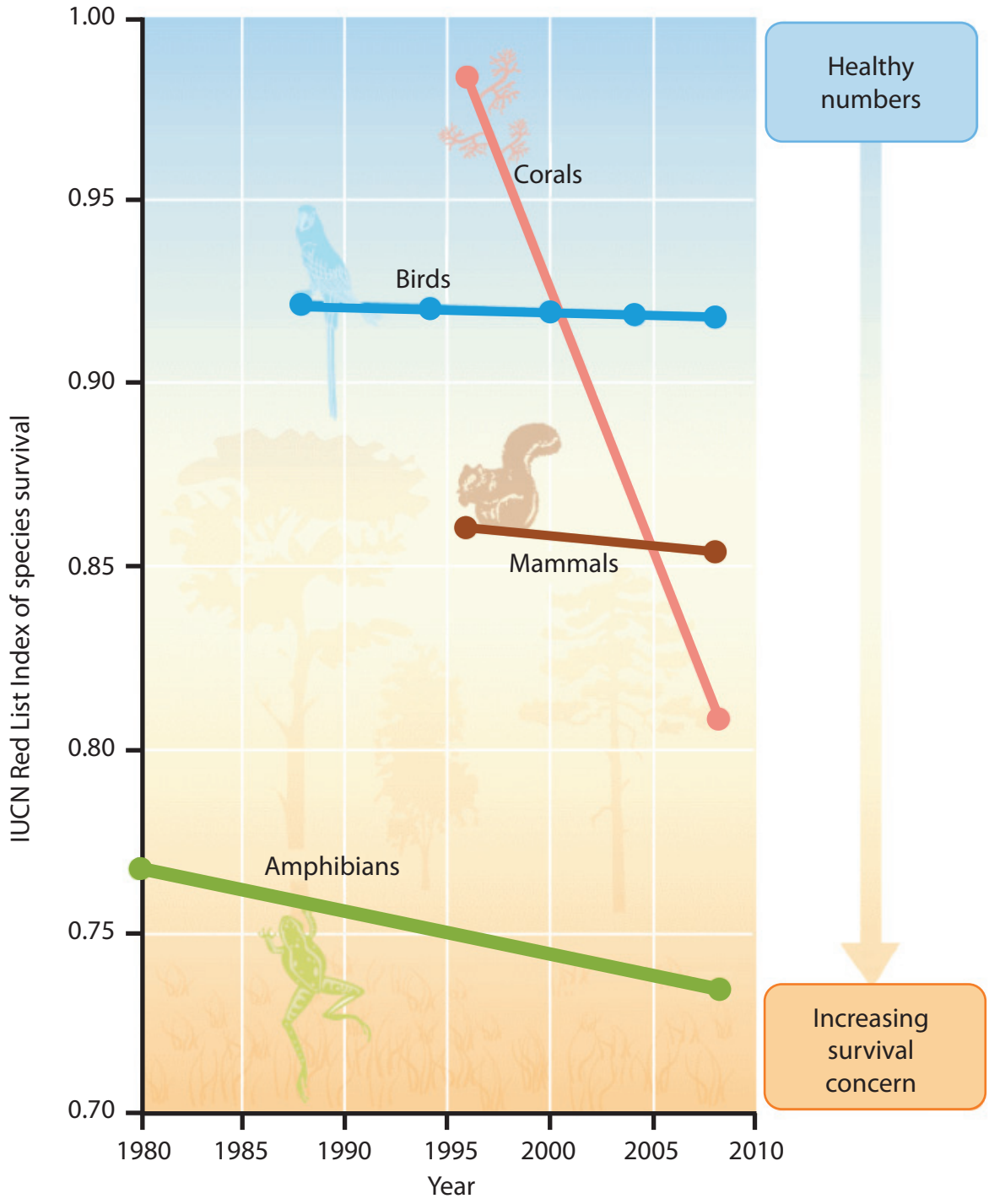
The following resources relate to Questions 1-5.

Figure 1 Trends in UK primary energy use, 1970 to 2030 (projected)



Source: UK Department for Energy and Climate Change

Figure 2 Global trends in the 'health' of four animal groups



Source: Secretariat of the Convention on Biological Diversity (2010) *Global Biodiversity Outlook 3*.

Figure 3 The changing pattern of the world economy

The British Imperial Era

Percentage (%) of global GDP in

1913

British Empire	37
USA	19
China	9
Germany	9

The Cold War era

Percentage (%) of global GDP in

1950

USA	27
USSR	10
UK	7
Germany	5

The USA dominates

Percentage (%) of global GDP in

1998

USA	29
Japan	13
Germany	7
UK	5

The future in 2025?

Percentage (%) of global GDP in

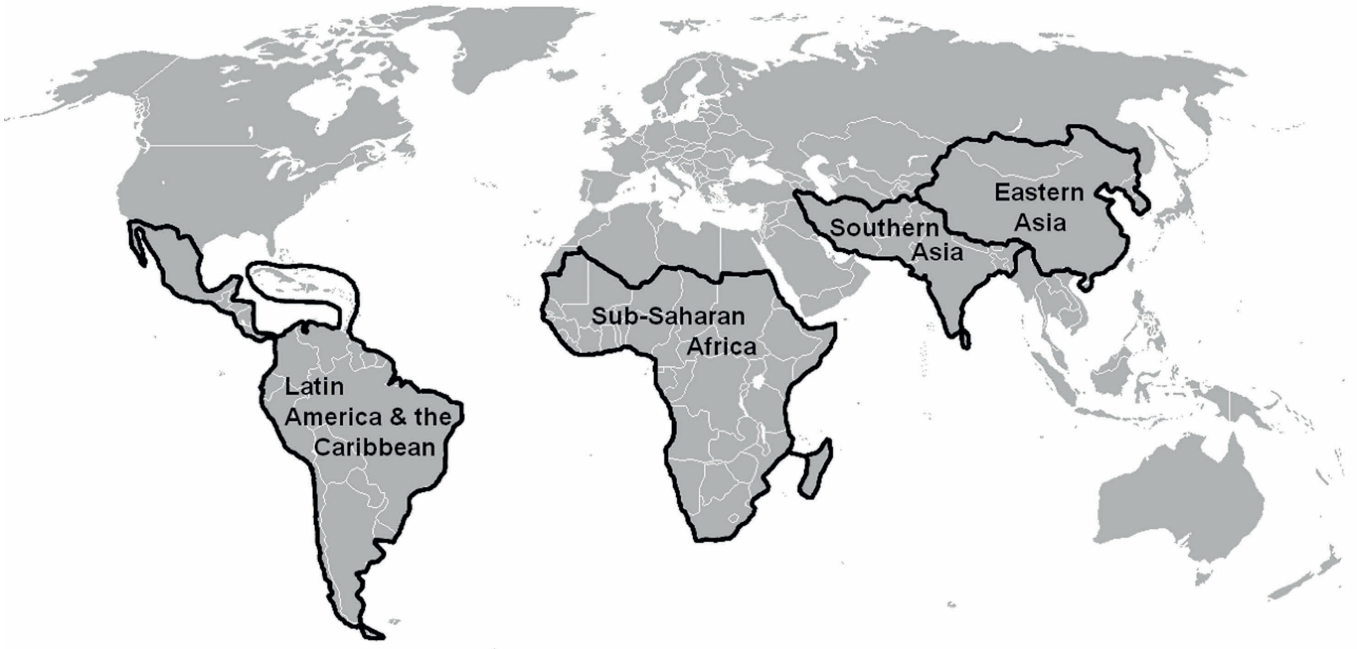
2025

USA	21
China	19
Japan	6
India	5

Figure 4 A progress report on five Millennium Development Goal targets

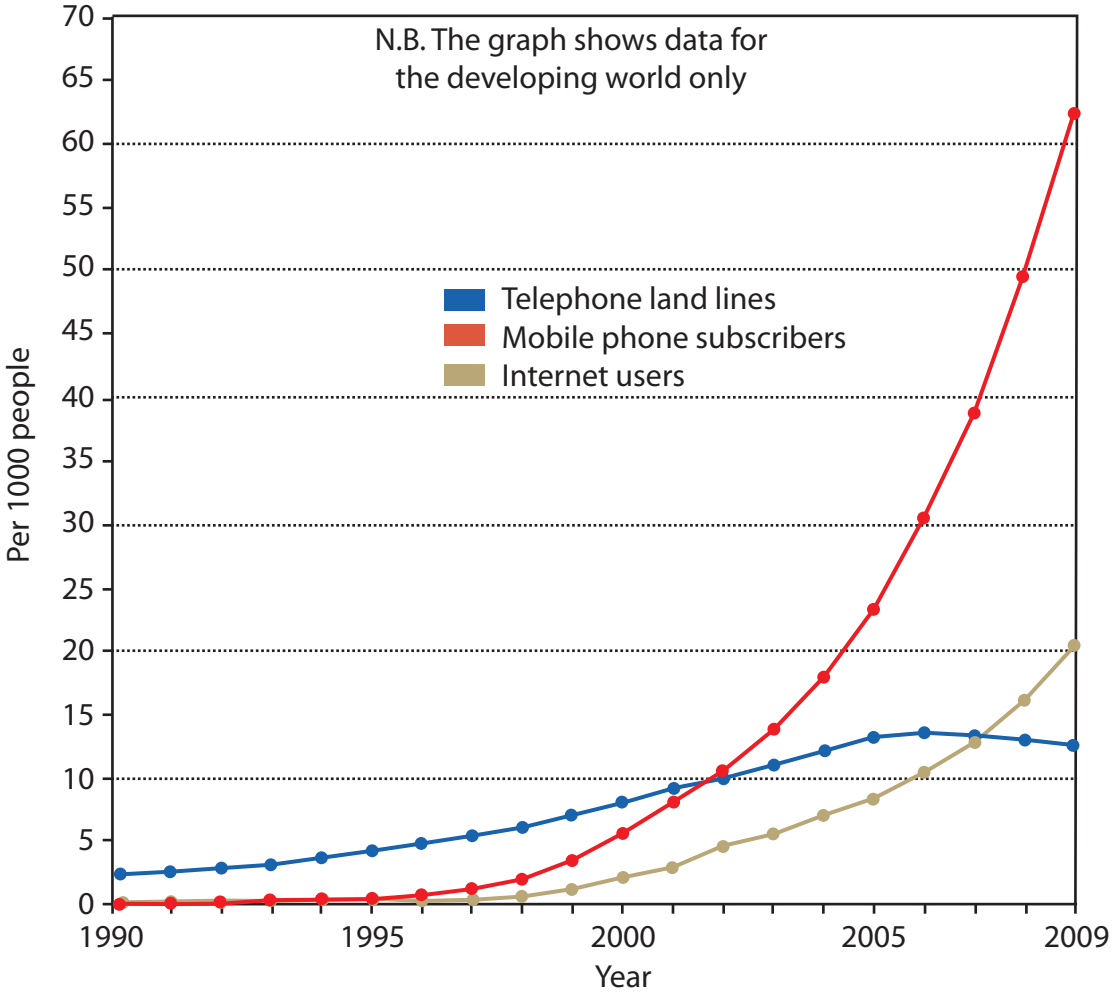
Key ● Target already met ● Likely to reach target by 2015 ● Unlikely to reach target by 2015 ● No progress/worsening situation	**Sub-Saharan Africa**	**Eastern Asia**	**Southern Asia**	**Latin America & the Caribbean**
1. Reduce extreme poverty by 50%	●	●	●	●
2. Reduce extreme hunger by 50%	●	●	●	●
3. Universal primary schooling	●	●	●	●
4. Reduce mortality of under 5s by two-thirds	●	●	●	●
5. Reduce maternal mortality by 75%	●	●	●	●

Millennium Development Goal regions:



Source: Adapted from the UN MDG Progress Report, 2010

Figure 5 Trends in communication technology in the developing world, 1990-2009



Source: Adapted from the UN MDG Progress Report, 2009

SECTION B

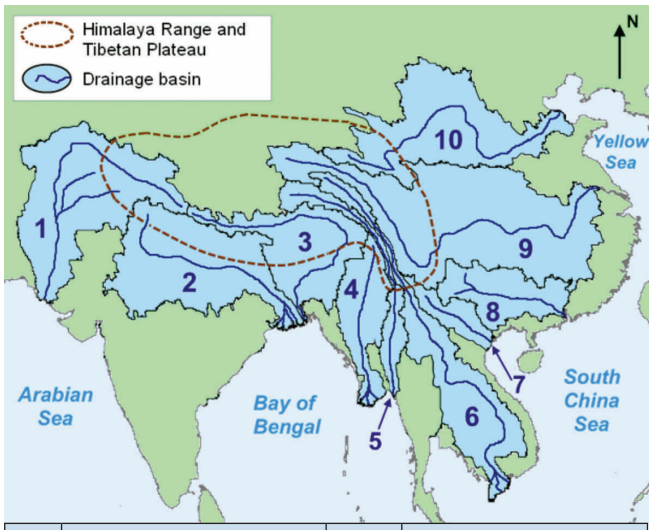
The following resources relate to Question 6.

WATER CONFLICTS

WATER RESOURCES IN THE HIMALAYA

Within Asia the Himalaya mountain range and Tibetan Plateau are key sources of water supply. The highest and largest plateau in the world, it contains over 45,000 glaciers. The area has huge stocks of water in the form of snow and ice, with a total area of 35,110 km^2 of glacier and ice cover. Rivers rising within this mountainous region, many of them **transboundary** in nature, supply millions of people with their fresh water (Figure 1) and include the Yangtze, Mekong, Ganges and Hwang Ho.

Figure 1: River basins in the region



1	Indus	**6**	Mekong
2	Ganges	**7**	Red
3	Brahmaputra	**8**	Pearl
4	Irrawaddy	**9**	Yangtze
5	Salween	**10**	Hwang Ho

The countries of South and East Asia which rely (wholly or in part) on Himalayan water had a population of over 3 billion people in 2008 (Figure 2). The mountainous and jungle borders of the region have a long history of **territorial disputes,** many of which remain unresolved (Figure 3). Himalayan melt water is especially important for river discharge outside of the main **monsoon** seasons.

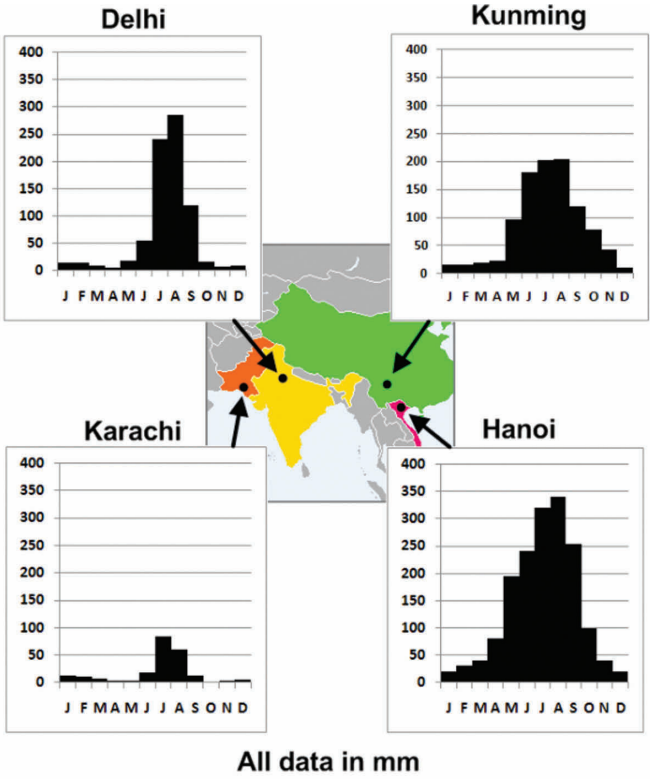
Figure 2: Countries of South and East Asia

Figure 3: Selected territorial disputes

India / Pakistan	Long running dispute over Jammu and Kashmir
India / China	Dispute over Aksai Chin area on India's NW border and Arunachal Pradesh on its NE border
India / Nepal	Disputed border in the Kalapani area of western Nepal
India / Bangladesh	Numerous disputed enclaves and border lines
China / Bhutan	Disputes along the border between Bhutan and Chinese occupied Tibet e.g. the Kula Kangri
Cambodia / Thailand	Several disputes including the temple area at Preah Vihear

Annual precipitation in the region is highly seasonal (Figure 4). In many locations the monsoon can be extremely variable in terms of strength and timing. Some 2 billion people depend on rivers fed by snow and ice from the mountain and plateau region.
Water resources in the region show wide variations. Some countries have ample **renewable water** per capita (Figure 5) whereas others fall well below the world average. In addition, many countries depend on water sources which originate outside the country (Figure 6).

Figure 4: Annual precipitation



In common with many rivers originating in the Himalaya Range, the Ganges is increasingly engineered to control flow and divert water. The Tehri Dam, which became operational in 2006, diverts 270 million gallons of drinking water per day. The Farakka Barrage, only 18km from the Bangladeshi border, reduced the average monthly discharge of the Ganges from over 2000 m^3/sec to under 400 m^3/sec. Increasingly, the Himalayan nations are building dams for flood control, water supply and hydropower. Nepal, Pakistan, India and Bhutan had constructed (working or being built) around 150 dams by 2008 and had plans for over 400 more projects (Source: *Mountains of Concrete:* Dam Building in the Himalayas, International Rivers 2008).

Some of the countries in the region are expected to experience significant increases in population by 2025 as shown in Figure 7. In addition, increasing numbers of people in many Himalayan countries are moving to urban areas from the countryside.

Figure 5: Water resources

Total renewable water per capita *(m^3/ year)*			% of total renewable freshwater resources used in 2002
	1988-92	**2003-07**	
Bangladesh	10000	7000	7
Bhutan	177000	115000	0.5
Cambodia	46000	33000	1
China	2400	2100	22
India	2100	1600	34
Laos	75000	55000	1
Burma	25000	21000	3
Nepal	10500	7500	5
Pakistan	1900	1300	75
Thailand	7000	6500	20
Vietnam	13000	10000	8
WORLD	***34100***	***25300***	***20***

(Source: FAO Aquastat database)

Figure 6: Percentage of total renewable water resources originating outside the country

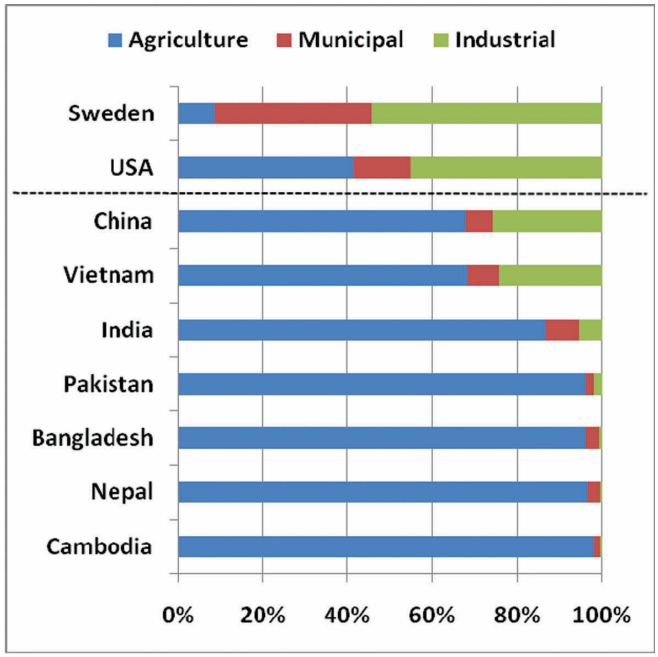
		Laos	43%
Bangladesh	91%	Burma	16%
Bhutan	0%	Nepal	6%
Cambodia	75%	Pakistan	77%
China	1%	Thailand	49%
India	34%	Vietnam	59%

Figure 7: Projected population growth in 4 countries

	Population (millions) 2002	**Population (millions) 2025**	**% increase**
India	1049	1330	27%
Pakistan	151	269	78%
Bangladesh	138	180	30%
Vietnam	82	110	34%

There are a number of **threats** to future water supply within the region. These are likely to intensify in the future. Figure 8 shows that within the region, agriculture is the dominant end use of most water but this may change over time. Industrial water demand is rising in some countries as they move towards a more industrial and urban way of life. **Industrialisation** increases water use. Some transnational companies, such as Coca-Cola in India, have caused controversy by allegedly using local water supply unsustainably.

Figure 8: Water use by sector



(Source: FAO Aquastat 1998-2002 data)

Urban development also places pressure on water resources. In India the urban population swelled to 325 million by 2001 – a similar picture is being repeated across South and East Asia. In many locations urban authorities have struggled to keep pace with demand. Delhi, with a population of 16 million people in 2008, suffers from a number of problems:

- Old, leaking and inadequate water mains which mean 40% of incoming supply is lost.
- Illegal connections to water mains which siphon off up to 25% of supply and is not metered or paid for.
- A daily need for around 4275 million litres of water, but a supply of only 3375 million litres.
- 1000s of unregulated and illegal wells, which have left 75% of groundwater supplies depleted and water table levels falling by up to 10 metres per year.
- Up to 4300 million litres of waste and sewage discharged into rivers daily.

Agricultural water demand is set to rise significantly in the region as populations grow and increasing wealth leads to more protein-rich diets. In many farming areas the crops are 'thirsty' cereals which rely on irrigation. Figure 9 shows one estimate of expanded irrigated crop area and water demand. About 60% of the discharge of the Ganges is diverted for large scale **irrigation.**

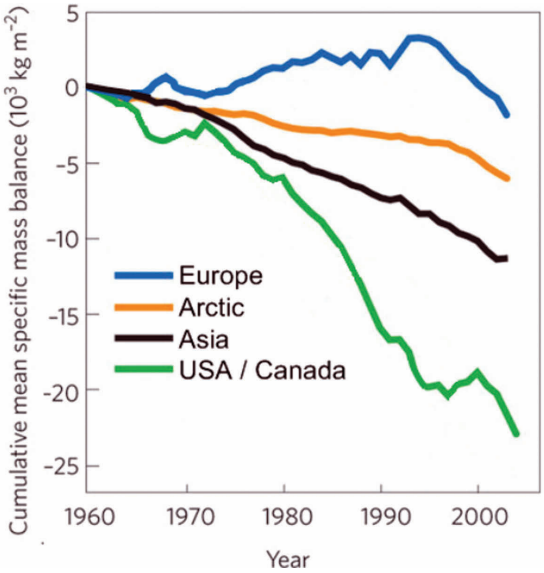
Figure 9: Projections for 2025

		Irrigated cereal area (million hectares)	Water supply requirement (km^3 / yr)
Pakistan	1995	10.3	178
	2025	12.2	203
Vietnam, Cambodia, Thailand	1995	6.3	39
	2025	8.7	61
China	1995	74	359
	2025	103	504

Source: (Water Use for Agriculture in Priority River Basins, WWF, 2003)

Climate change in the Himalaya region has caused increasing alarm and controversy, with questions raised over the accuracy of some data in the 2007 IPCC 4th Assessment. Despite this, there is a consensus that glaciers in the Himalaya Range and Tibetan Plateau are in retreat, as they are elsewhere in the world (Figure 10).

Figure 10: Mass balance change for glaciers in four regions



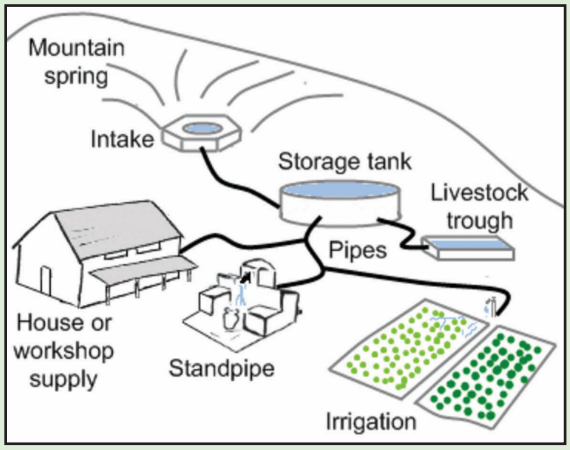
(Source: adapted from 'Settling the Science on Himalayan Glaciers', Nature, 2010)

Other possible climate changes reported by the IPCC include rising average temperatures, a decline in summer precipitation over the central parts of arid and semi-arid Asia, leading to periodic severe water stress conditions. Increasing rainfall intensity, particularly during the summer monsoon, is leading to rising flood risks in Asia (e.g. the Pakistan floods of 2010).

Figure 11: Three water management schemes

INTERMEDIATE TECHNOLOGY

- **Multiple Use Water Systems** have been built in Nepal supported by the NGO, Practical Action. They use local materials and simple technology to bring water to where it is needed.
- Gravity, and a system of pipes, move water from springs and streams to supply agriculture and people. This can provide families with over 1000 litres of water per day for a multitude of uses – water that previously had to be carried by hand.



INTERNATIONAL AGREEMENTS

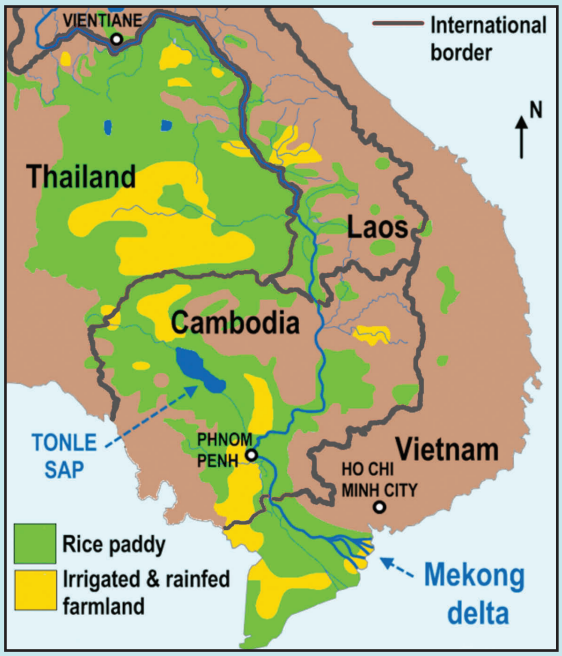
Mekong River Commission (MRC)

Formed in 1995, the MRC is an agreement between Cambodia, Laos, Vietnam and Thailand. These countries share the waters of the Mekong River. In 1995 the four countries signed the *"Agreement on the Cooperation for the Sustainable Development of the Mekong River Basin"*. China (where the Mekong rises) and Burma are not formal members. The Mekong is critically important to the countries that share it:

- 50% of Thailand's arable land lies just west of the Mekong
- 17 million people live in the Mekong Delta and it supports over 50% of Vietnam's rice production
- half of all Cambodians rely on water, fish and other resources from Lake Tonle Sap, which the Mekong fills.

Upstream, the Mekong in Laos and China has significant HEP and water supply potential which the MRC is designed to manage.

Lower Mekong River:



LARGE DAMS

Diamer-Bhasha dam, Pakistan

Plans to construct a multi-purpose dam on the River Indus in Diamer Province upstream of the existing Tarbela dam date back to the 1980s. The 4500MW hydropower dam would store water (for irrigation, domestic and industrial consumption) and contribute to flood and drought management. Cost estimates range from US$ 8-13 billion if the project is started as planned in 2010 for completion in 2016. It has been reported that the World Bank has refused to fund the mega-project and that it may be funded, and built, by China.

Pakistan Water and Power Development Authority EIA of Diamer-Bhasha dam:

Environment Impact Assessment

- 32 villages affected
- 4228 households affected
- 30,350 population affected
- 2660 hectares of agricultural land submerged
- 100km of major highways submerged
- More than 33,000 prehistoric rock carvings submerged

View 1
"The gross per capita water availability in India is projected to decline from about 1,820 m^3/yr in 2001 to as little as 1,140 m^3/yr in 2050, as a result of population growth. Another study indicates that India will reach a state of water stress before 2025, when the availability is projected to fall below 1,000 m^3 per capita. These changes are due to climatic and demographic factors. The relative contribution of these factors is not known."
Climate Change and Water **(Technical Paper of the IPCC, Geneva, 2008)**

View 2
"Initial studies of how the rivers will respond to ice loss show modest changes in stream flow - far from the IPCC report's dire scenario of rivers running dry. Even if the glaciers were lost completely, flows down the Indus would drop about 15% overall, with little or no change in the dry-season flow, one recent study found."
Settling the science on Himalayan glaciers **(Nature, 2010)**

View 3
"Problems of water stress are already prevalent in the region, due to the increasing demands of domestic, agriculture, industry and the growing population. Rapid urbanisation, population explosion and haphazard development are the main causes of the increasing pressure on our vulnerable freshwater resources. Thus, any reduction in the availability of freshwater could have serious consequences for food security, people's livelihoods, industrial growth and environmental sustainability the world over."
An Overview of Glaciers, Glacier Retreat, and Subsequent Impacts in Nepal, India and China **(WWF Nepal Program, 2005)**

View 4
"China has already built 4 dams on the Mekong without really consulting its downstream neighbours, and plans many more. What the Chinese are doing shows a selfish lack of concern for the serious damage their dams will ultimately do to downstream countries."
Anonymous view from Cambodia

View 5
"China has rejected claims that its dams on the Mekong River are to blame for record low water levels in downstream nations. Speaking at a summit in Thailand, China's vice foreign minister said drought and not hydropower was to blame for the reduced river flow. Parts of the river are at their lowest levels in 50 years. Further downstream, drought, salt deposits and reduced soil nutrients are threatening food production in the rice bowls of Cambodia and Vietnam. China has eight planned or existing dams on the river and says it wants more."
BBC News website, 2010.

View 6
"The primary benefit of dams and reservoirs in the world is water supply. Most dams are built for several purposes including irrigation for agriculture (food supply), flood control, hydropower, inland navigation and recreation. This produces a broad range of domestic and economic benefits from a single investment. An additional local benefit is the employment opportunities during the multiple year construction of a reservoir project."
Swiss Committee on dams, 1999

Websites for further research:

http://www.mrcmekong.org/
The website of the Mekong River Commission.

http://practicalaction.org/
Practical Action (formerly the ITDG) is an NGO which works worldwide on development issues.

http://www.internationalrivers.org/
International Rivers is a non-profit NGO founded in 1985 to address the impact of dams.

http://www.wapda.gov.pk/
The website of the Pakistani Government's Water and Power Development Authority.

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