



Global Issues

RIVER BASIN MANAGEMENT

What are the Outcomes?

1. Use a wide range of graphical and numerical skills and techniques in the context of global geographical issues by:

- 1.1 Interpreting a wide range of numerical and graphical information
- 1.2 Analysing information from a range of numerical and graphical information
- 1.3 Synthesising information from a range of numerical and graphical information
- 1.4 Reaching a conclusion based on evidence about a complex global geographical issue

What are the Outcomes?

2. Draw on and apply knowledge and understanding of significant global issues by:

- 2.1 Giving detailed descriptions and detailed explanations of the interaction of physical and human factors in the context of a complex global geographical issue
- 2.2 Giving detailed descriptions and detailed explanations of the strategies adopted in response to a complex global geographical issue

You need to know / be able to:



- Investigate the physical characteristics of a selected river basin
- Explain the need for water management in both a given and chosen river basin
- Explain the selection and development of sites for dams
- Explain the consequences of water control projects for a chosen river basin

What is River Basin Management?

So much of the world has a need for **human intervention in the flow of rivers**, to ensure a supply of water to the places and the amounts that are needed.

The usual response is to build dams, creating reservoirs in which to store water which can then be controlled.

This is called **River Basin Management**



How do Dams work?

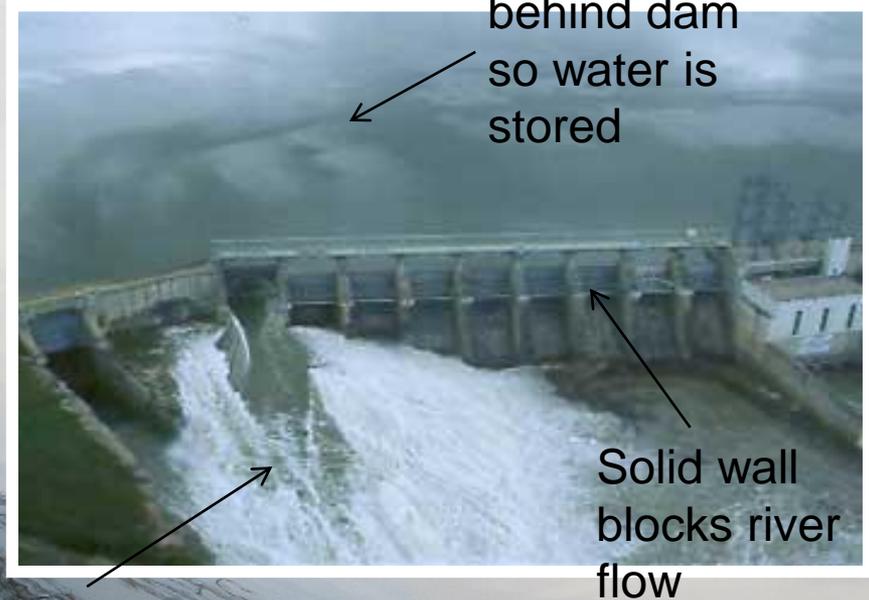
"A reservoir is a man's triumph over nature and the sight of a vast sheet of water brings an inner satisfaction to those who behold."

S.H.C. de Silva

Consultant to the Irrigation Department of Sri Lanka, 1991

How do dams work?

A typical dam is a wall of solid material built across a river to block the flow of the river thus storing water in the lake that will form upstream of the dam as water continues to flow from the river upstream of the dam. The main purpose of most dams is to create a permanent reservoir of water for use at a later time.



Reservoir
builds up
behind dam
so water is
stored

Solid wall
blocks river
flow

Water can be released in
controlled amounts

A dam must have some way of releasing water in controlled amounts as it is needed i.e. an outlet valve of some type. Depending on the purpose of the dam the water may be released into a pipeline to supply a city with water, or into a hydro-electric power station to generate electricity or the water may simply be released into the river downstream of the dam and allowed to flow naturally, eventually to be pumped out and used for irrigation of crops further downstream.



The Need for Dam Building

Group / paired discussion

What circumstances (physical and human) would create a need to build a dam (s)?

Write down some of your ideas in a quick spider diagram

Did you come up with these?

- Where there is a flood risk
- Where there is a warm climate causing lots of evaporation
- Where there is a dry climate with limited rainfall
- Where there is a need to provide electricity for industry / towns
- Where there is a need for irrigation
- Where there is a growing population
- If a river has lots of tributaries

Interpretation questions: explaining the need for RBM in a given river basin

In the exam you are likely to be given data to do with a river basin you have not studied.

You will be expected to use the data to explain why there is a need for river basin management in that particular drainage basin. In other words what has prompted the requirement to build dams?



Use the information on the following slides to create a spider diagram checklist of the factors you should look for in the data.

Factor 1: Rainfall Patterns



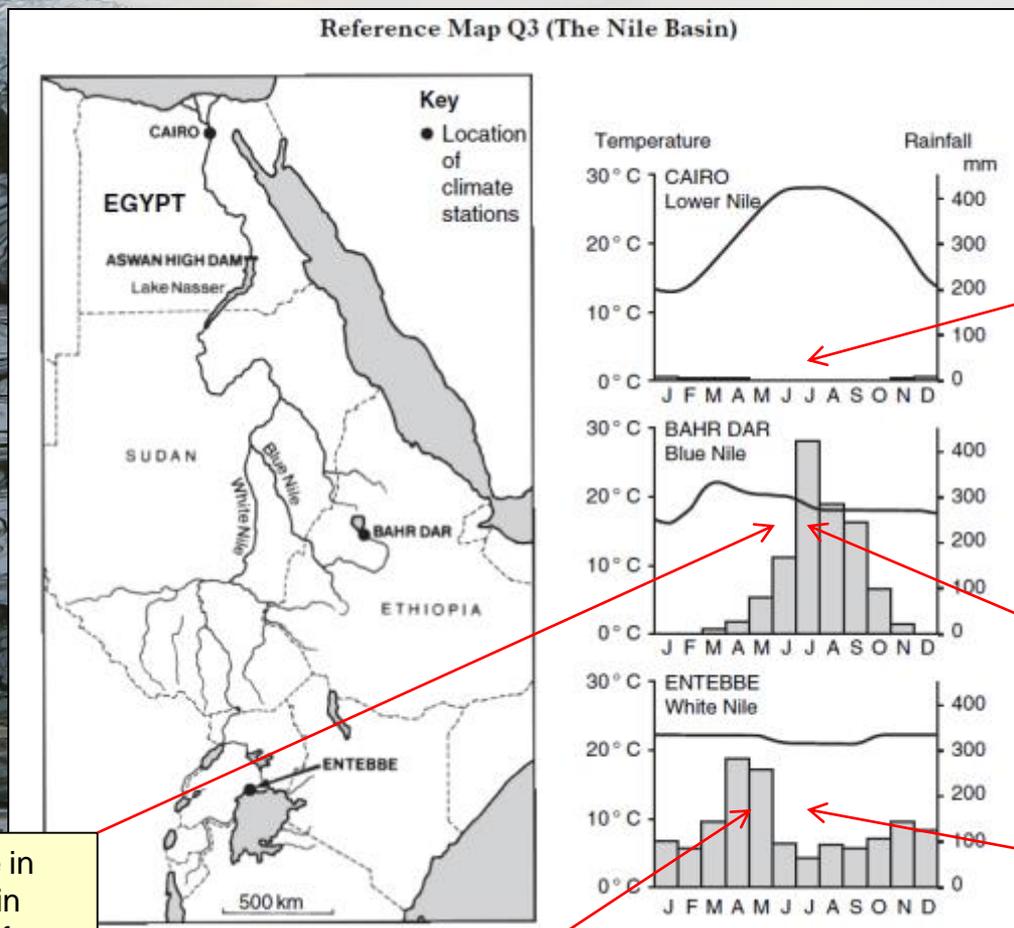
- Low or unreliable rainfall patterns (low rainfall throughout the year means a water deficit so unable to meet supply. High rainfall at certain times of year and none or low at other times – could store the water when there is a surplus for times when there is a deficit)
- The possibility or need for the transfer of water from area of surplus to area of deficit (where you have areas in the same river basin which have plentiful rainfall and other areas which have hardly any).
- The need to reduce likelihood of flooding (if there is high rainfall all year or at certain times)

An example

(a) Study Reference Map Q3 and Reference Diagram Q3.

Explain why there is a need for water management in Egypt.

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Seasonal imbalance in rainfall. Extra water in JJA could be stored for use in deficit months of JFD

Excess rainfall in April and May could cause flooding. A dam could control this

Cairo gets hardly any rainfall (total water deficit) so water stored by upstream dams could be used by Cairo throughout the year

Rainfall peaks in JJA – risk of flooding which dam could control.

Plentiful rainfall in Entebbe. Throughout year. It has a surplus which could be stored by building dams and transferred to deficit areas downstream

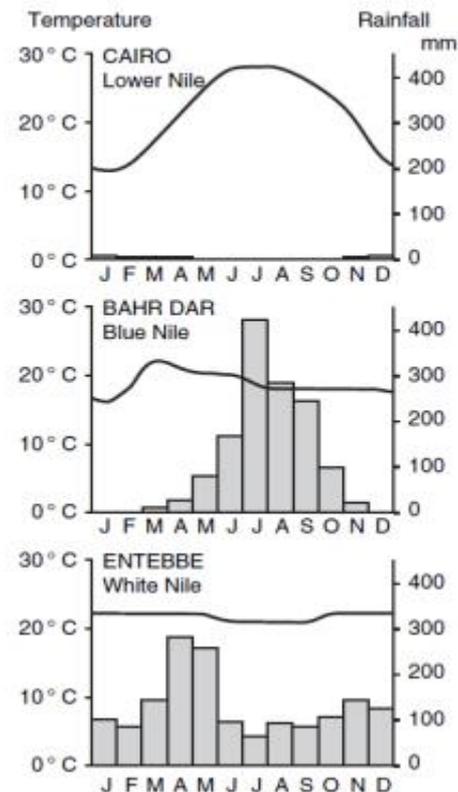
Factor 2: Temperature



Entebbe and Bahr Dar have high temperatures reaching above 20 degrees, while Cairo has a peak in the middle months

Look for patterns which show high temperatures all year round or high temperatures at particular times of year. If the temperature is high evaporation of water will be rapid, so water in the drainage basin may be limited. Dams could store more water in deep reservoirs so it is less likely to be evaporated.

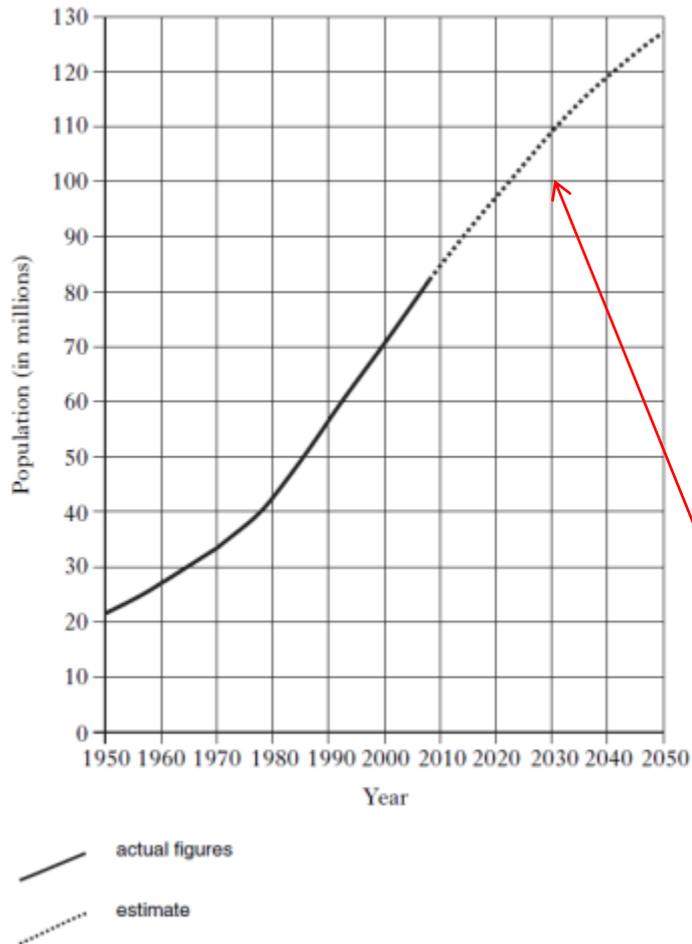
Reference Map Q3 (The Nile Basin)



Factor 3: Population Growth



Reference Diagram Q3 (Population of Egypt (1950–2050))



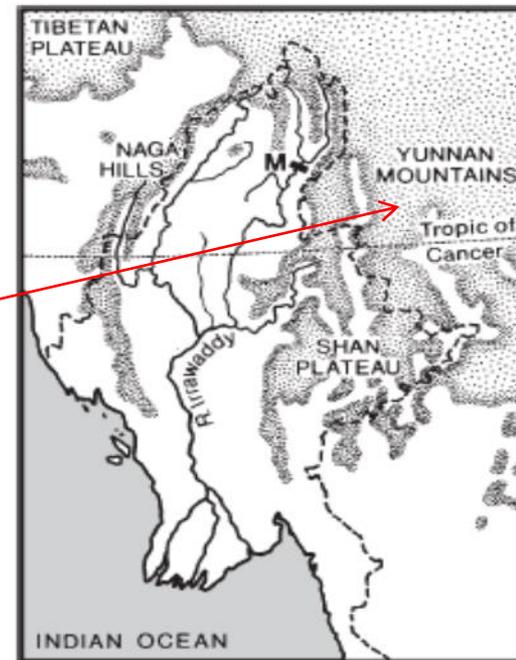
Look for statistics that show population has grown rapidly or a drainage basin that contains lots of large cities. The large amounts of people will put demands on the water supply for domestic water use, irrigation water for crops and growing industries will also need water. These will all cause the need to build dams to store water to meet demand

In this example you can see a massive rise in the population by an extra 108 million people between 1950 and 2050.

Factor 4: Relief of Basin

If a drainage basin contains lots of mountainous land this will increase the risk of flooding due to melting snow and increased surface run-off. Building dams will help to control the river's flow and reduce damage to the surrounding settlements by flooding

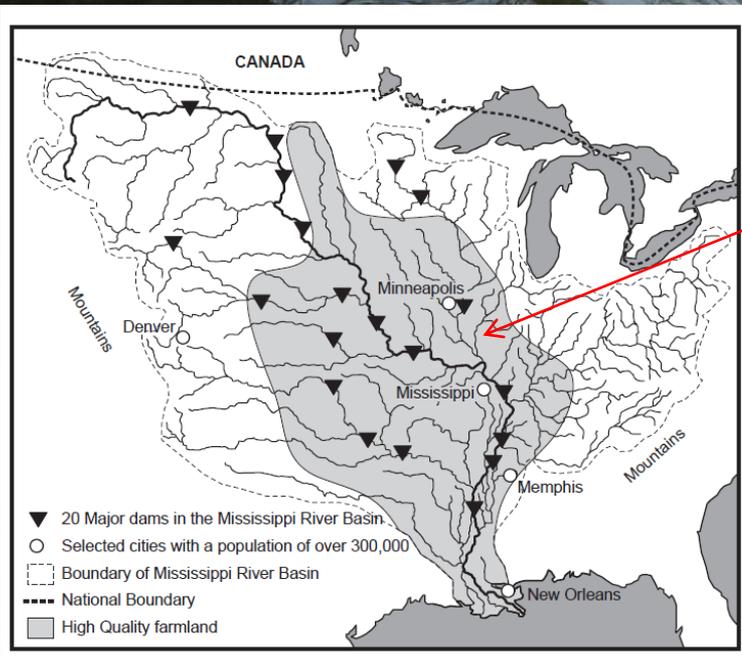
In this example of the Irrawaddy river there is a vast quantity of mountainous land within the drainage basin



M Myitsore Dam
Land over 1000 metres

Factor 5: Drainage Density

Look for a river that has a high drainage density (lots of adjoining tributaries). These will cause the rapid transfer of water to the river, increasing discharge and therefore the potential risk of flooding. Dams could interrupt the flow of these tributaries, storing water and allowing it to be released in a controlled amount.



In this example the Mississippi drainage basin clearly has a high drainage density

Additional Factors (knowledge points)

Building dams could create a supply of hydro electric power which could be used by nearby cities and industry. If you are given statistics that show the area is relatively poor with a low standard of living (low GNP) then you could argue that generation of HEP could improve living standards and help the country to develop.

Building dams could control the rivers flow, making it calmer and more navigable by ships / boats. This could improve trade and transport



Your Turn

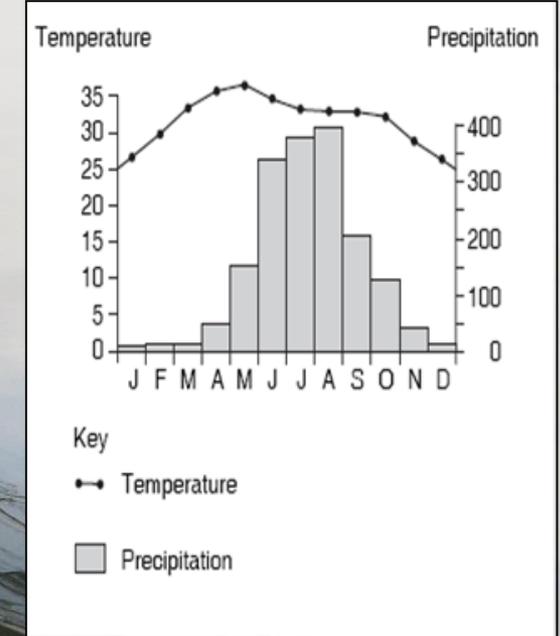
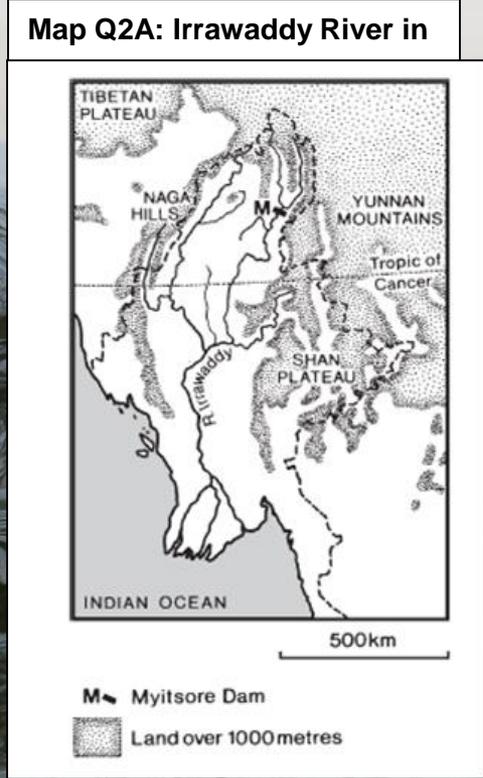
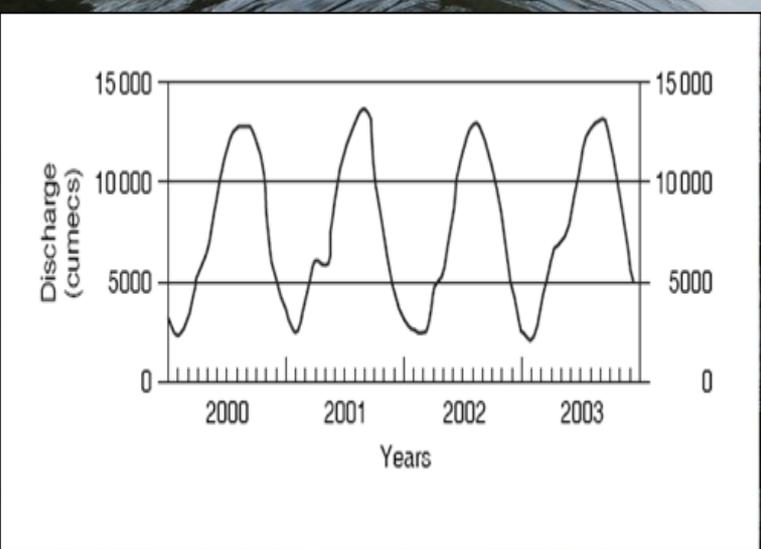
Study Map Q2A and Diagrams Q2A, Q2B and Q2C.
 "The Myitsore hydro-electric project was started in 2008 to manage the flow of the Irrawaddy River in northern Myanmar (Burma)."

Explain the need for water management in the Irrawaddy River in Myanmar.

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Diagram Q2B: Myitsore – Climate Graph

Diagram Q2A: Monthly discharge of the Irrawaddy River at Myitsore before the HEP scheme



Use the data on the question sheet as well as your checklist to answer the question.

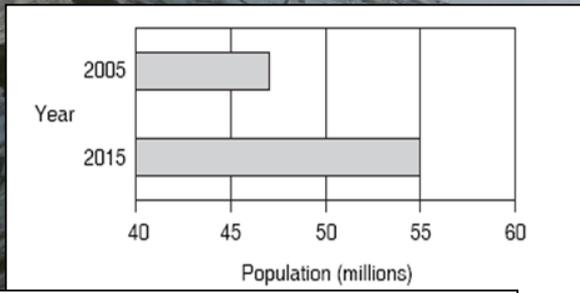
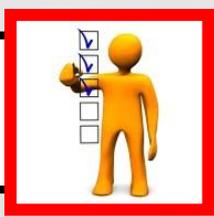


Diagram Q2C: Projected population change in Myanmar

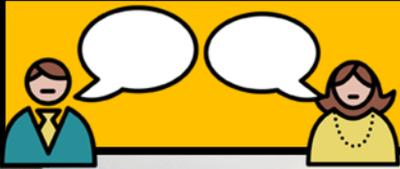


Check your answer!



Explanation of need for water management might include:

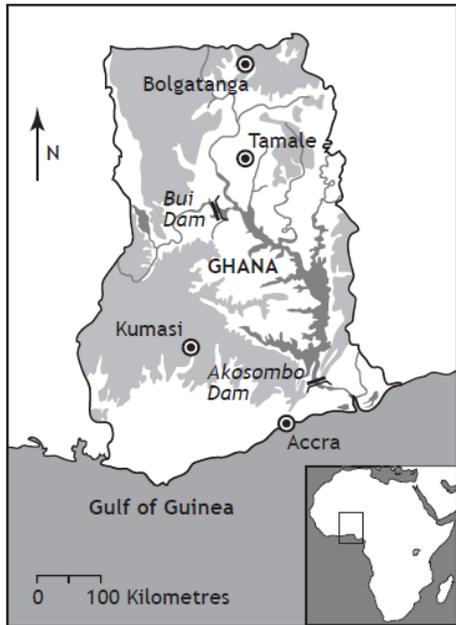
- Reference map Q2A indicates that the Irrawaddy River has many tributaries and the river basin has a very high drainage density leading to unpredictability of river flow which is dependent on when and how quickly snow melts in surrounding mountains areas.
- Rapidly increasing population in Myanmar gives increasing demand for water for domestic, power, industrial needs.
- Increasing demands from farmers for irrigation water to try and feed increasing population.
- Rainfall graph for Myitsore indicates seasonal nature of rainfall – extremely dry from November to April but huge monthly figures for June/July/August – leading to flooding and also run-off of water that could be stored and used in dry months.
- Temperature graph for Myitsore indicates hot temperatures throughout the year leading to very high evaporation rates. Monthly temperatures peak at 35°C.
- Reference diagram Q2A indicates that there is a need to regulate flow of river to prevent flooding during peak discharge and to keep water level high enough for navigation in dry months.



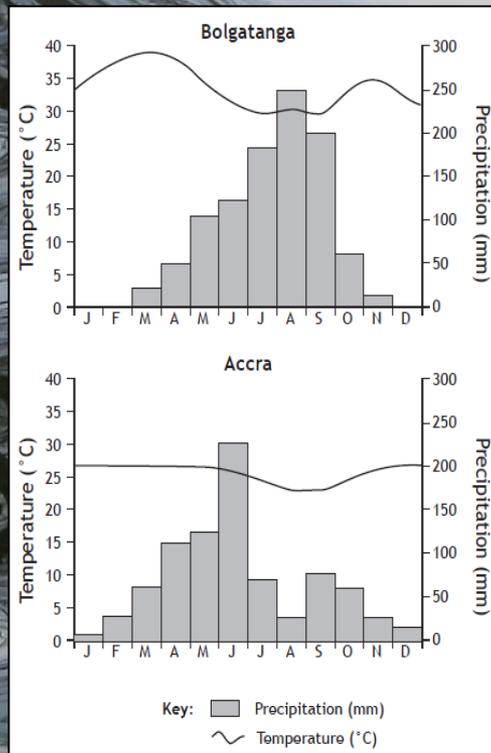
Another example

Work in Pairs:

You have been asked to analyse the data below (and on your sheet) to convince a panel of experts including Government representatives that Ghana is in need of water management. Put together a speech to present to the panel to convince them of this case. You must ensure all the points you make are backed up by relevant evidence from the data.



- City
- Land over 500m
- Dam
- ▭ River



Current population	24.28 million
Projected population by 2040	35.8 million
Labour force by occupation	56% in agriculture 15% in industry 29% in services
% of population with access to electricity	45%