

**Learning Outcome 4: Planning and Management of Water Resources****Key Ideas:**

- Identify and give examples how water resources are being managed in areas of water scarcity and water surplus
  - Evaluate the effectiveness of the different strategies used for managing fresh water resources, using at least one case study from an area of water scarcity
1. **Damming of Water**
    - Building dams can help satisfy a number of needs at once
    - Help control flooding
    - Stores water for variety of uses including
      - o Irrigation
      - o Recreational purposes
      - o Continuous supplying water throughout the year e.g. Egypt, Asian High Dam
  2. **Computerized and Monitoring**
    - Growing and the increasingly use of computers, tied into satellite based monitoring systems provides nearly instant information on pollution or flood hazard e.g. Japan and US rivers
  3. **Drip feeding irrigation**

E.g. Israel and Sahel Countries

    - irrigation of the desert provides productivity at a high cost
    - this is done by using small pipes laid above the ground, allowing water to drip out at regular intervals where it is needed, so none is wasted
    - drip feeding irrigation system helps conserve water resources
    - also avoid threat of parasites diseases spread by irrigation
    - reduce soil salinization
  4. **Urban Plumbing**
    - Leaking urban water supply systems must be replaced
    - Water using equipment can be redesigned to use water efficiently e.g. Japan redesigning toilet water system to reduce water waste
    - Water meter record the exact amount of water used and a bill is paid.
  5. **Plane to transfer water.**
    - Using of water grids allow water to be moved from areas with water surplus to areas of high demand e.g. USA-Alaska to South West USA-Colorado desert
    - Aqueduct in deserts to take water to the deserts e.g. Atacama
  6. **Village Help Scheme**
    - Used of limited fund to dig holes to reach underground supplies
    - Modern pumps are then used to obtain the water e.g. Sahel-countries (e.g. Mali)
    - Plastering of concrete in Mali, Africa, and villages in India.
  7. **Education (use of water wisely)**
    - Public awareness on the important of water, keeping water clean and safe to improve sanitation
    - Health education is significant especially at village land
    - Using media for mass education and public awareness
    - Use a bucket of water to wash vehicles rather than a water hose
    - Turn off water while brushing teeth etc.

8. **Plan for clean water or sanitation**
  - This could be hard to implement as financial capability does not allow it and the ever increasing population is an obstacle
9. **Water Houses and Recycle e.g. UK**
  - Water can be used more than once e.g. industries can use water after the city has used it
  - Laundry water can be used to water gardens, clean louvers etc.
10. **Desalination of sea water**
  - Distill sea water to get fresh water e.g. Britain
  - Salt water is distilled for suitable drinking water. This is expensive
  - Water desalination plants e.g. Saudi Arabia and Nauru
11. **Construction of water storage tanks**
  - E.g. Low coral island such the Ha'apai Group
  - Poor supply of underground water, so tanks collect rain water from rain
12. **Domestic water conservation**
  - Use of composting toilets, showers with low water consumption
13. **Artificial Web (water catchments)**
  - In desert, trapping of moist air on a web which is then shaken into a funnel and into a container for collection
14. **Estuary barrages (artificial barriers)**
  - Estuaries. The water behind would gradually turn fresh as waters flowing into the area dilutes the original sea water.

**Case Studies: How effective has planning been in managing water as a resource?**

1. **Computerized Monitoring**
    - Very effective in pollution and flood detection
  2. **Drip feeding Irrigation**
    - Saves a lot of water and at the same time productivity continues therefore very effective.
  3. **Urban Planning**
    - Depending on reporting the damages, but once it is fixed, it is water saving
  4. **Water Transfer (from surplus to deficiency)**
    - Effective on satisfying demands
  5. **Village Help Scheme**
    - Effective from using simple tools
  6. **Educating and Public Awareness**
    - Very effective
  7. **Water reuse and recycling**
  8. **Desalination**
  9. **Artificial Web**
  10. **Tanks Construction**
- } *All effective*

## CASE STUDY: China's Three Gorges Dam

Below is the largest dam on China Yangtze River (the third largest in the world) where the largest hydroelectric dam and reservoir which is about 2 kilometres long.



### Why the Three Gorges Dam was built?

- i. To produce electricity for homes and businesses in and around the city of Chongqing as well as other part of China. By producing electricity in this way is far safer than using nuclear or oil or coal burning thermal power stations to produce it.
- ii. To control flooding in the lower Yangtze Basin.
- iii. To improve navigation through the middle Yangtze Basin. The new reservoir behind the dam will allow ocean going ships to reach Chongqing, a port 2000 kilometres upstream from Shanghai and the ocean.

### ADVANTAGES of the Dam

- This super dam generates almost 10% of China's electricity for use by industries and about 150million people.
- Help China reduce her dependence on coal, which causes severe pollution and releases enormous amount of the greenhouse gas carbon dioxide into the atmosphere.
- Hold back the Yangtze River's flood waters, which have killed more than 500,000 people during the past 100years including 4,000 people in 1998. The 15million people living in the Yangtze River Valley will benefit from such flood protection. This greatly exceeds the 1.9 million people who will be relocated from the area to be flooded to form a 600 kilometres long reservoir behind the dam.
- Reduce flooding and silting of the river by eroded soil.

### DISADVANTAGES of the Dam

- Forming the huge reservoir will flood large areas of productive farmland and forests and displace about 1.9million people from their homes.
- The region's entire ecosystem will be radically changed

#### Two major problems associated with water supply are:

1. Insufficient, unreliable rainfall with one third of the land being too dry for agriculture, seasonal drought, variations in rainfall amounts from year to year. ***It is a lack of adequate water that has hindered development?*** In part of Africa, people may have to walk several kilometres a day to obtain water- a tiring, time consuming job which usually falls upon the women and children
2. Even those countries in the developing world which do have water may well find that it is not clean. Even fewer areas have adequate safe methods of disposing human waste.



Drinking water in Calcutta is often contaminated by sewage

In the North most people have sufficient clean, piped water and main sanitation. In the South only two out of five people have access to safe water and only one in four has adequate sanitation.

- Rural areas are far less likely to have clean water and sanitation than urban areas.
- The numbers without adequate sanitation especially in the urban areas actually increased as a result of the growth of shanty towns.

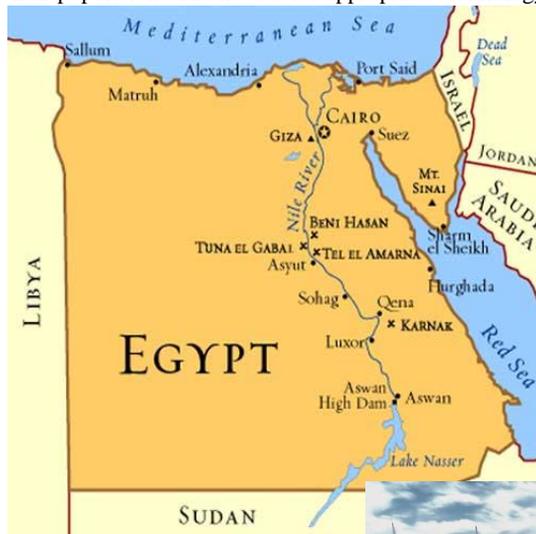
### CASE STUDY: Aswan High Dam

Egypt is the gift of the Nile, for without this river the land would be desert and Egypt's 6000 year old civilization could never have flourished.

The White Nile rises near equator where it rains throughout the year, giving the river a constant flow. As the river flows northwards it receives two large tributaries, the Blue Nile and Atbara, which rise in Ethiopia. Here it rains heavily for nearly six months only to be followed by drought. It is there two rivers which used to cause the annual flood and which spread fertile silt over the flood plain.

For centuries, Egyptians have dreamt of controlling the flow of the river to ensure a constant supply of water for irrigating the land. A dam had already been built at Aswan, and twice enlarged during the early 20<sup>th</sup> century, but it was the High dam begun in the mid-1960s that was to transform the life of Egypt. Aided by Russian money, the dam was completed in 1971. It created a lake measuring the length of England. The dam has benefited the Egyptian economy, but it has also had adverse effects upon the environment, which were not fully anticipated.

Aswan Dam is extremely expensive to build and can cause as many problems as they solve. How can the poorer countries in the world provide a clean and adequate water supply for their population? The need is for appropriate technology.



Water can be applied more efficiently by sprays and sprinklers than by allowing water to flow through channels. For row of crops drip irrigation is being used increasingly. Here pipes, with small holes in them, are laid over the ground, and water 'drips' at regular intervals onto the crops. No water is wasted.

- Village self-help schemes use limited funds to dig holes to try to reach underground supplies. Modern pumps are then used to obtain the water.
- Many well and surface reservoirs in hot tropical areas lose much water through evaporation and seepage. New wells have concrete sides and a cover. To try to reduce two problems. Concrete also prevent possible seepage of sewage into the well.
- Educating local communities to use their supply wisely, to keep their supply clean and improve sanitation. Health education is playing important role the Health World Organisation (WHO) suggested that 80% of the world's diseases are caused by dirty water and inadequate sanitation. For example, cholera, typhoid, malaria, bilharzias and river blindness.

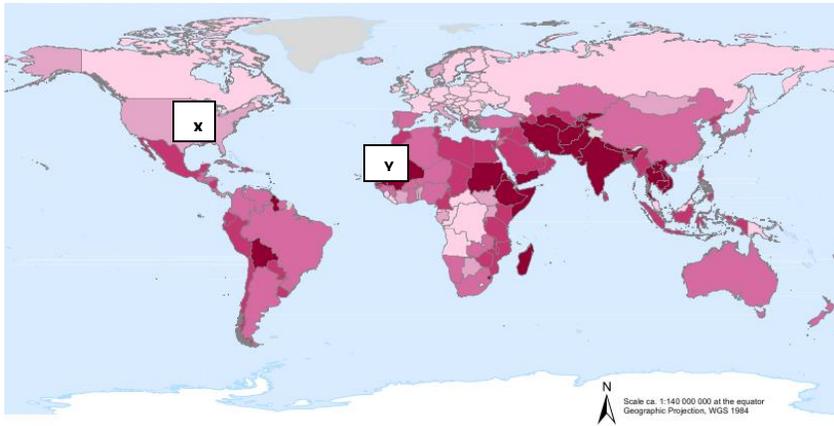
### **Clean water for all**

The ten years 1981-1990 were designed by the United Nations, the "**Clean Water and Sanitation Decade**". By 1983 many developing countries had drawn up short and long term plans to try to provide more and permanent clean water supplies, and to give adequate sanitation. The biggest obstacles to success are not only limited financial and technical resources, but also the rapid rowing of population of many of these countries and the expansion of shanty settlements within urban areas.



**REVISION EXERCISE ON WATER**

1. Study the map below and answer the questions that follow



- a. Locate and name TWO area of water surplus – label it **A** and **B**
  - b. Locate and name TWO area of water scarcity – label it **C** and **D**
2. What is the difference between people living in areas **X** and **Y** in their perception of fresh water resources? Suggest ONE for this different perception.

---

---

---

---

---

---

---

---

3. Explain the negative effects of using water resources on the environment.

---

---

---

---

---

---

---

---

4. Study the cartoon below and answer the question below.



a. Discuss the perceptions of two people in the cartoon and give examples.

---

---

---

---

---

---

---

---

5. People with access to safe water.



a. Describe **TWO** problems faced by the people shown in the picture above.

i. 

---

---

---

---

ii. 

---

---

---

---

b. Describe **TWO** effective methods for ensuring that people have access to water.

i. 

---

---

---

---

ii. 

---

---

---

---