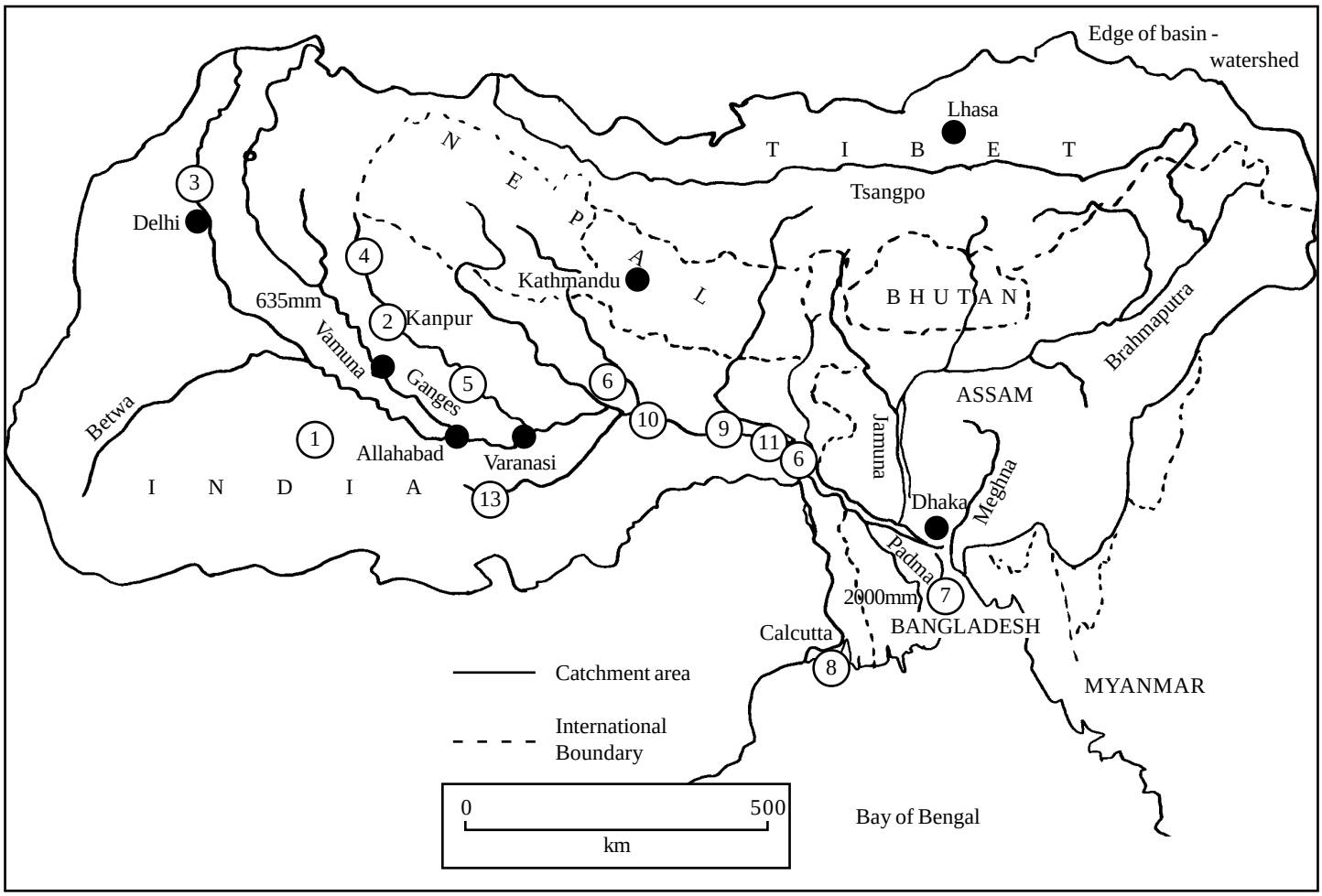
Geo Factsheet

Number 85

Managing the River Ganga (Ganges) II - Water Quality

This Factsheet summarises the main problems faced with the water quality of the river ganges. Fig 1 shows the locations where some of the most serious water quality isuues occur.

Fig 1. Issues of Quality in the River Ganga Basin



1. Bleaches and dyes from numerous textile factories
2. Boom time for the leather works (ISI) - use of chromium and other chemicals released into river
3. Rapidly growing capital city area. 2nd largest industrial area in India - growing source of pollution
4. Heavy sedimentation from deforested hillsides - issues for drinking water
5. One of main areas of green revolution
   Fertilisers - eutrophication.
   Use of pesticides including DDT drawn into rivers pollute shallow wells
6. Pollution from 25 large cities
   1.3 billion litres of sewage per day, thousands of animal carcasses (sacred cows etc.) delivered to delta zone
7. Increased salinisation kills mangroves in swamp area of sunderbans and problems for papermills
8. Problems from heavy industrial areas and sewage in Calcutta (mega-city)
9. McDowell distillery major pollution problem
10. 10 million people bathe in Ganges everyday - a major health hazard. Colform bacteria 1000 times above safe limits
11. Sugar refinery

In India, nearly 70% of the available water is polluted and water borne diseases such as cholera and typhoid account for 80% of all health problems. 40% of the Indian population has access to a safe water supply, while only 25% of the population have access to sanitation facilities. The Ganga drains around a quarter of India's land area and provides a quarter of its water resources – and typifies the wider Indian situation.

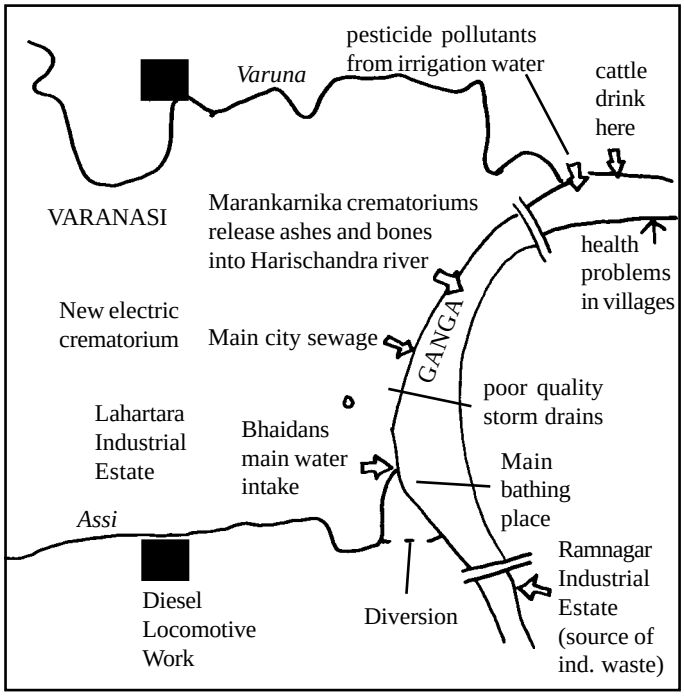
Fig 1. shows the huge potential for the Ganga to become polluted – population growth, rapid urbanisation, intensified agricultural practices and dynamic industrialisation are all factors.

The Ganga however is India's holiest river, and there is an age-old belief that the Ganga, unlike other rivers, has some magical self cleaning properties which can absorb any amount of contamination. Whilst there is some scientific evidence that the Ganges is able to get rid of pollution much more effectively than many other rivers, for example it has a very high rate of re-aereation, the amount of pollution that is released far exceeds the amount that the river can process. The huge quantities of sewage released (103 billion tonnes daily), combine with large quantities of extremely damaging industrial waste (206 million tonnes daily). In 1986 there was ample evidence how dirty the Ganges was in certain stretches of the river, for example downstream from Kaupur or Patna, the river was almost lifeless.

Despite some stringent pollution control measures, outdated technologies, a lack of capital and poor infrastructure and the expense of the legal process to prosecute offenders, contribute to the low levels of compliance with environmental legislation. The anti-pollution rule does not match the harsh reality of chronic pollution from industrial sources.

Fig 2 focuses on Varanasi – India's oldest and most Holy City where daily thousands of Hindus purify themselves by bathing in the Ganga river. It is a million city, with a thriving industrial sector. It also has many areas of poverty and overcrowding in its rapidly growing urban areas. Garbage is often piled high in the streets, breeding disease and vermin and open drains carry human waste directly to the Ganga. Besides human waste, toxics from the growing industrial sector also pour into the river (see map). Half burnt bodies (because of the escalating costs of fuel wood for cremation), and dead carcasses of cattle further pollute the river. In Varanasi, as in other large towns along the Ganga, such as Kanpur, Allahabad and Patna the river was filthy. There was an enormous need to begin a river clean-up.

Fig 2. Water quality issues around Varanasi



Early in 1985, the Indian Government launched the Ganga Action Plan (GAP) – its first major attempt to systematically control and monitor the pollution of the river.

In its first five-year phase (1985-1990) the £100 million scheme concentrated on the 27 largest cities (100,000 people or more) on the dirtiest stretches of the river. The aim was to install or renovate sewage – pumping stations and treatment plants, as well as providing low-cost sanitation facilities, and establishing sewage networks where necessary. Experts argued that preventing urban sewage from flowing directly into the Ganga should be the top priority as it was the most widespread pollutant and very difficult to manage. Industries in India are responsible for treating there own waste water and therefore GAP is not specifically concerned with regulating and controlling industrial pollution. The first phase became disastrously behind schedule with long bureaucratic delays, with little support after the initial launch from the National Government. Poor communication with local people to involve them in clear up schemes was a major issue. There were also questions about the appropriateness of the imported sewage works technology – it required a constant electricity supply and the sewage works were energy intensive and very expensive to run. Whenever power failures occurred brown sludge (untreated sewage) was diverted into the river; in particular some areas get a back flow of raw sewage. Conversely the electrically powered crematorium has been extremely successful in Varanasi and worked well. However the plan to breed flesh eating turtles to clear up the body remains was less successful as people ate the turtles – in 1998 none could be traced.

Monitoring at Varanasi and other large towns has reported a better quality of water with lower levels of faecal coliform, especially in the main bathing areas, although monitoring in the rural areas along the Varuna (see map) has shown increased pollution adjacent to the new sewage works.

The GAP has also generated local interest in Varanasi. The Sankrat Mochan Foundation has been formed (1982) and has developed plans for an alternative lower cost and appropriate sewage treatment system, which involves the interception of sewage along the river and diverting it via gravity flow to large oxidation ponds. The activity of special algae will remove pollutants from this system. Foundation members have also spoken to thousands of householders along the river – and 100,000 people have stated they will help build the dam walls for the oxidation ponds, as an act of religious devotion, dedicated to cleaning up the river.

The foundation has also established the Swatcha Ganga Research Laboratory to conduct water quality testing in the Varanasi area and also an Environmental Education Centre, which runs programmes with schools, local villages, boatmen, pilgrims etc on how to measure water quality, and promote activities which will protect the river.

Meanwhile the second phase of the plan, **Ganga action plan**, aimed at cleaning up the Yamuna (which flows through Delhi and past the Taj Mahal) has received little publicity, although it is apparently in progress. Clearly it will be needed to improve pollution levels in the main river Ganga.

Any plan such as GAP which did not involve the people living along the rivers, or did not tackle their poverty, which is largely responsible for the pollution problems in the first place, is not likely to succeed. In this case not only was GAP **not bottom up** community led, but nor was it effectively **top down** administered – the state authorities of Uttar Pradesh and Bihar both have poor administration records and were responsible for many bureaucratic delays. In areas such as Delhi, residents have had to resort to legal action to require authorities to set up sewage treatment plants along a very 'dirty' stretch of the Yamuna.

Conclusion and Review

You have now had an opportunity to look at issues in this large and complex drainage basin.

The challenges posed in the introduction, of managing a river with very wide variations in discharge, and coping with enormous amounts of pollution in an International river, with a huge range of conflicting demands imposed on it are beginning to be met.

For both quantity and quality issues mega projects, financed by International funding, have been carried out in an attempt to manage the two problems of flooding in Bangladesh, and escalating pollution along the Middle Ganga. You have had the opportunity to assess these top down projects, and also to consider alternative management models. These alternative models would be considered to be more sustainable as they work with the environment and local communities to attempt to provide equitable solutions. The message has to be one of hope and practical improvements in spite of the escalation of the flooding problem and the exponential trends in pollution – in particular the International Agreements made in 1996, should encourage more holistic management and integrated strategies necessary for the future.

This case study can be used, with your sketch maps to answer a number of exam questions. A selection is shown below.

With reference to a named large drainage basin:

1. Explain how physical factors make the river difficult to manage (look at relief, climate, vegetation etc and their impact discharge and sedimentation.)

2. Explain how variations in discharge can pose problems for river managers (look at low and high flows temporally and spatially, also think about the quality of water as well as quantity).

3. Assess the success of management strategies used to manage either issues of water quantity or water quality (review GAP and FAP with alternatives).

Or with reference to a named area which experiences regular flooding.

4. Outline the causes of the floods and assess the success of any schemes developed to manage them.

5. Discuss the statement that the main causes of flooding lie in human factors as opposed to physical factors (use Figure 4 as a basic).

Acknowledgements;
This Geo Factsheet was researched and written by Sue Warn
Geo Press, Unit 305B, The Big peg,
120 Vyse Street, Birmingham, B18 6NF

ISSN 1351-5136