


Risks and Opportunities:

What are the main risks from wastewater?

What opportunities exist for wastewater management in your town ?

Module 2 Session 3

The background of the slide features several faint, light-colored water ripples. These ripples are centered in the lower half of the page, with one large ripple on the left, a smaller one in the middle, and another large one on the right. The ripples are composed of concentric circles, creating a subtle, organic pattern.

What are the risks of unmanaged wastewater ?

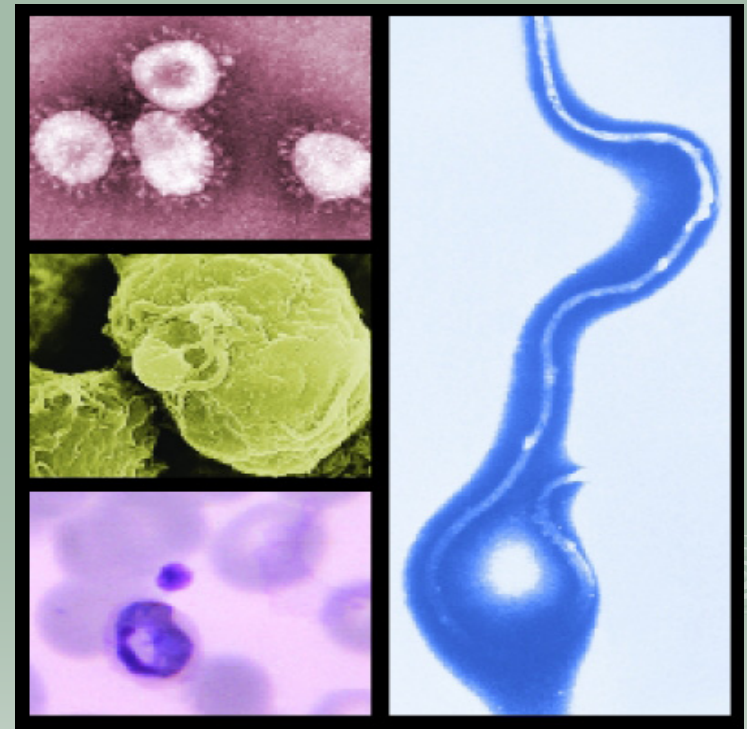
There are two main types of risk:

- Health risks from pathogens in wastewater.
- Environmental risks from organic material in wastewater.
- Heavy metals in industrial wastewater may cause health and environmental risks.



Health Risks

- Health risks from unmanaged wastewater are caused by Pathogens.
- Pathogens are infective organisms (viruses, bacteria and small animals such as worms or protozoa) excreted from one person with a disease and entering body of another person.



Read
session note

Local factors which increase health risks of wastewater

Local factors include :

- Amount of water a household uses, higher water use generates more polluted wastewater.
- Health status of the population – eg poorer communities with higher levels of worm infections will have higher concentrations of nemotode eggs.



Order of magnitude of health risks

Class of Pathogen	Likelihood that use of wastewater (inc excreta) will increase frequency of disease
1. <i>Intestinal nematodes (ascaris, trichuris and hookworm)</i>	HIGH
2. <i>Bacteria infections: bacterial diarrhoeas and typhoid</i>	LOWER
3. <i>Viral infections – viral diarrhoeas, hepatitis A</i>	LEAST

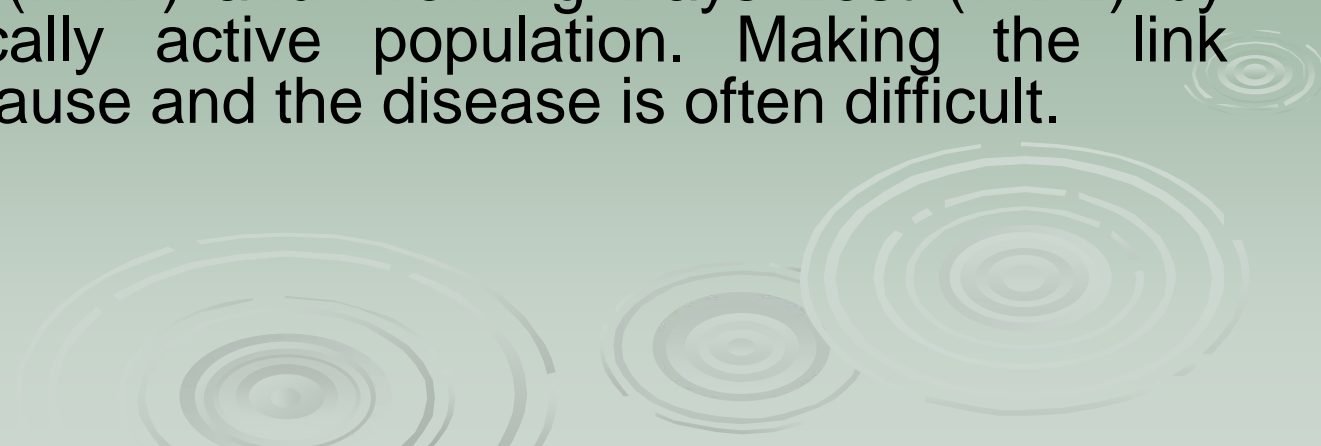
Blumenthal, U.J., Strauss, M., Mara, D.D., Cairncross, S. (1989). **Generalised model of the effect of different control measures in reducing health risks from waste reuse.** *Water Science and Technology*, Vol. 21, pp. 567–577

Assessing Health Risks from wastewater in your Town

Options include reviewing data and health records on:

- Incidence of diarrhoea and dysentery;
- Outbreaks of endemic gastro-enteric illnesses
- Incidence of worm infestation within a sample population eg children in a particular area.

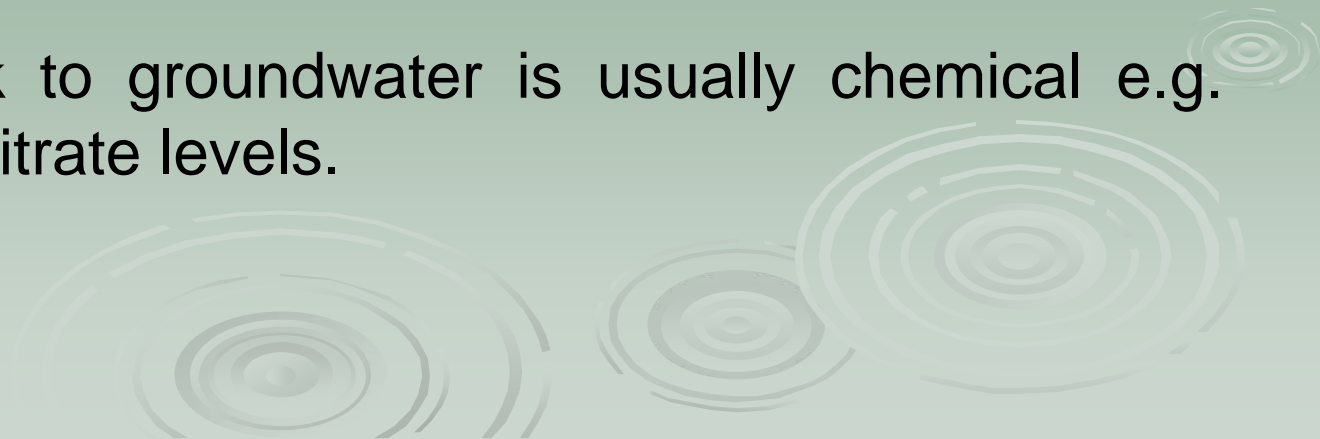
Health data is sometimes linked to numbers of Restricted Activity Days (RAD) and Working Days Lost (WDL) by the economically active population. Making the link between the cause and the disease is often difficult.



Environmental Risks

The main environmental risks from wastewater is pollution of surface and ground waters.

- When wastewater is discharged to a pond, river or stream, the organic material in the waste breakdowns through the process of oxidation.
- The main risk to groundwater is usually chemical e.g. through high nitrate levels.



Ways to measure pollution

- The pollution level or concentration of waste in wastewater is measured by the amount of oxygen required to oxidise or breakdown the waste. This may be expressed as the:
 - BOD – Biochemical oxygen demand – the amount of oxygen required to breakdown waste by bacteria over 5 days at 20 deg C.
 - COD – the Chemical Oxygen Demand.
 - Faecal coliform concentrate and concentration of nematode eggs measure other risks.

What is happening as a water body becomes polluted ?

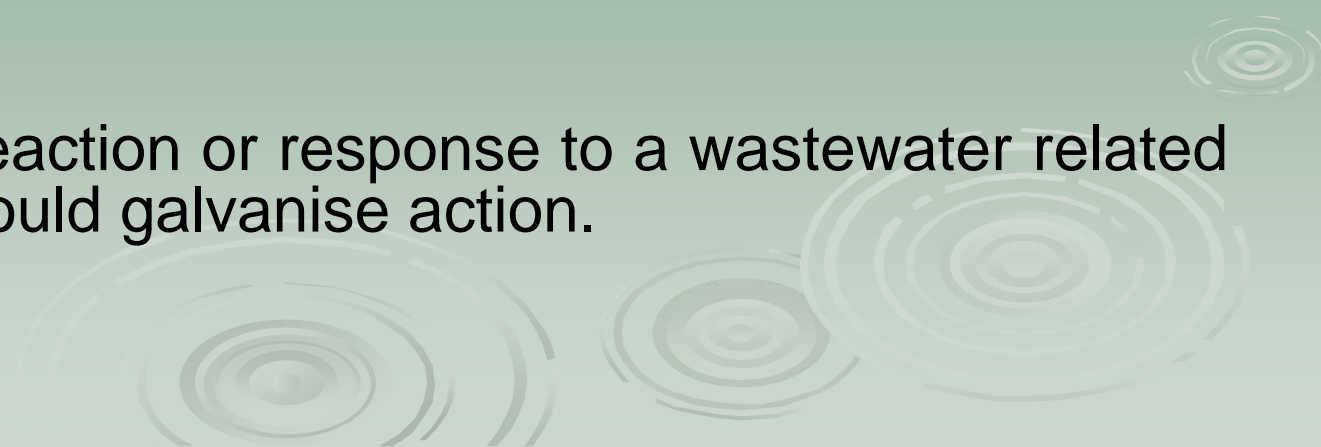
- When untreated wastewater flows into a pond or stream, the demand for oxygen (BOD) to breakdown waste is high.
- Water contains dissolved oxygen that plants, fish and other aquatic life live off.
- If the demand for oxygen to breakdown the waste in water exceeds the amount available - fish start to die, then all aquatic life. As the anaerobic bacteria take over water bodies start to produce 'bad smelling' chemicals eg sulphides.

How to assess the levels of pollution in a waterbody.

- Observation and local knowledge – people usually know the level of fish stock or plant life that a lake or river supports or used to support. Using participatory techniques it is often possible to trace changes over time quite accurately through tapping local knowledge.
- Standard tests and testing kits also exist to measure pollution eg BOD or faecal coliform counts. Series data is usually need to plot changes over seasons and time.

Opportunities

A plan for wastewater management in the town should assess and build on local *opportunities*. An opportunities *scan* might look at :

- Existing investment plans or known local resources (labour, skills or savings) available
 - Groups, individuals or organisations interested in better wastewater management or dependent on water for their livelihood.
 - Community reaction or response to a wastewater related 'shock' that could galvanise action.
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Investment plans or local resources

A scan would cover :

- Committed investment in primary, secondary drainage infrastructure.
- Household, school or hospital sanitation programmes that could be adapted to lessen treatment requirements (eg through separation of greywater) or to include local treatment (eg construction of communal septic tanks)
- Local resources or funds which could include communities with experience in construction of community infrastructure or funding mechanisms (eg VietNam)

Vietnam Public Labor Fund

- Under Government decree 16th September 1999 each year, every citizen should contribute 10days labour for 'public interest'.
- In case study of Hanoi City, the ward People Committee uses the public labour and money paid in lieu of labour for routine O & M for drainage channels and construction of tertiary network.



Organisations or Interest Groups

A review of organisations may include:

- Farmers Unions or organisations of agricultural workers - concerned with availability and content of waste used for irrigation.
- Community based or neighbourhood organisations - in areas with wastewater problems (flooding, waterlogging, no disposal system)
- Women's Organisations – in their 'managing role' of local environment women's organisations often actively mobilise and seek solutions to local problems
- NGOs specialising in water and sanitation who may be active or interested in promoting better practices.

Local response to a 'shock'

- The shock to a community of pollution of a local community resource (the lake, a river or pond) obvious by smells and odours or dead fish/plants –can be an entry point for change.... Change may include :
 - Changes in behaviour – not polluting the pond
 - Community pressure on local politicians to prioritise the problem
 - Or raising resources to solve a problem.

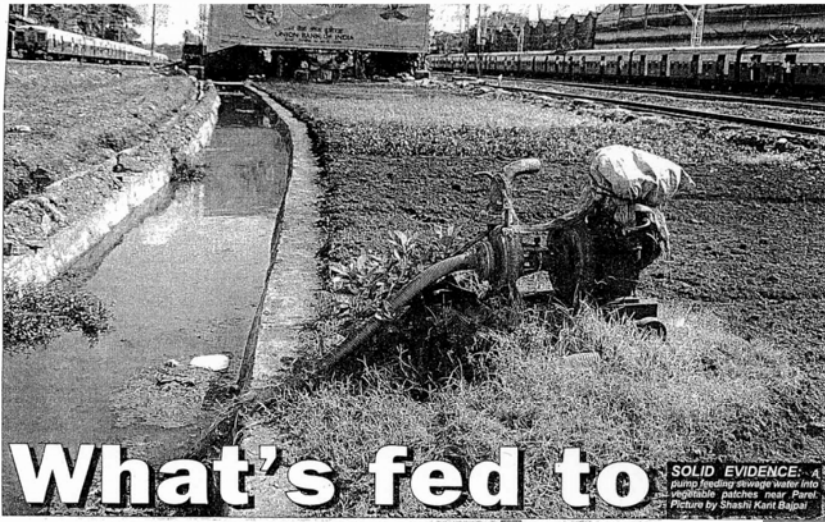


Pollution of Lake Dianchi, Kunming China

- In 1992 Yunnan Environment Department sought support from the World Bank and DfID to investigate the deterioration of Lake Dianchi, a large plateau lake adjacent to Kunming City in South West China, from which the city obtains 50% of its water and was also the recising body for all it's liquid waste. Most of it untreated.
- Future economic development and the health and well-being of the cities inhabitants were seen as threatened by pollution, smell and eutrophication of Lake Dianchi.
- Analysis of pollution sources identified untreated urban sewage and wastes from two large fertiliser factories as the main contributors to the eutrophication of the lake.

Debate on contamination of vegetables with wastewater

- Extract from article -
- “ Housewife Gita Shridhar says “ I have seen vegetables grown beside the railway tracks being watered (using sewage). I have been advised by my doctor not to allow my children to eat raw vegetables.....Shridhar says that after washing the vegetables she buys, she boils them in salt and turmeric to destroy any possible pathogens.



What's fed to your veggies

By Manoj Nair

THE pakak you picked up from the market today could have been grown using water from the city's gutters.

More than 210 acres of railway land in the city are being used by railway employees to grow vegetables. Most of these farms use water from drains running along railway tracks.

According to the Brihanmumbai Municipal Corporation's (BMC) health department, a survey conducted eighteen months back showed that vegetables grown in such patches were not safe for consumption. Yet, the farms flourish to this day.

On the triangular piece of land between the Western and Central Railway tracks near Parel station, labourer Dharen Chauhan grows pakak. When asked how he watered these plants, he pointed to a pipe emerging from the drains, running along the patches.

According to doctors, apart from the obvious threat of typhoid and jaundice, such vegetables carry the threat of amoebic infection. It can lead to chronic amoebic colitis, says General Practitioner Dr Prakash Kawaii. He explains, "The surfaces

of some vegetables are too rough and it is difficult to dislodge dirt from plain washing. Eating sandwiches and chutneys made from raw and improperly washed vegetables can lead to chronic amoebic infection. The infection is difficult to diagnose since it doesn't lead to diarrhoea.

Pathologist Dr Sanjay Baldota baulks at the very idea of growing vegetables using sewage. "It is unsanitary. Pathogens that cause water-borne diseases like gastroenteritis and hepatitis are present in sewer water. Nobody has done a study on all the ill effects these vegetables could have," says Baldota.

BMC's Additional Executive Health Officer Dr R M Kathuria says that the water used could contain the dangerous e-coli organism. "We find a high coliform content in this water," says Kathuria. But the railways deny the fact that the vegetables are unsafe.

Central Railway Chief Public Relations Officer Mukul Marwah says, "As far as I know, water from the drains is not used. We have conducted periodic tests. There has been no complaint of contamination," said Marwah. Housewife Gita Shridhar says, "I have seen vegetables being

grown beside the railway tracks being watered in this manner. I have been advised by my doctor not to allow my children to eat raw vegetables, not even carrots," she says.

Shridhar says that after washing the vegetables she buys, she boils them in salt and turmeric to destroy any possible pathogens in them. "But if I have doubts about them being watered with sewer water, I would not buy them at all," she says.

Meanwhile the Central Railway plans to use some of the land recovered from slum dwellers on the Harbour line to grow more vegetables in the same manner.

SOLID EVIDENCE: A pump feeding sewage water into vegetable patches near Parel. Picture by Shashi Karit Bagar

Metro Midday Newspaper 24th June 2000.