Securing groundwater as a water resource

WaterAid

Right to life

- Article 21 of the Constitution of India guarantees the right to life

- The SC and HCs interpret the right to life to include safe water

Yet,

This human right continues to be violated again and again

Groundwater: Crisis levels

- Groundwater is limited, use unlimited
- Heavy over-dependency for drinking, agriculture, industry, other use
- Even drinking water needs unmet…

… an indicator of the severity

Groundwater use

- 16/19 million wells in use; draw 231 BCM of water
- In 2001, 18.5 million of the 19.7 million minor irrigation schemes are groundwater-based
- 65 per cent of irrigation groundwater based
- 85 per cent of drinking water sources are groundwater based
- Problems of slippage – 100,000 habitations slip back annually

Pot of pollution

Types of Industries	Groundwater pollution
Chemical Manufacturing	Arsenic, lead, aluminium, cyanide, nitrates, fluorides, chlorides, mercury, chromium, nickel found in groundwater. Dirty, dark water rendered useless
Pulp and Paper mills	Iron, chromium, cadmium, mercury, lead, manganese, zinc, nitrates, fluorides and pesticides found in groundwater
Tanneries	Hexavalent chromium, mercury, arsenic, pesticides found in groundwater.
Dye Industry	Mercury, lead, chromium, iron, zinc, fluorides, chlorides, sodium and T.D.S. found in large concentrations in groundwater
Distilleries	Heavy metals like arsenic, lead, aluminium, cyanide, cadmium and chromium found in groundwater. Very high levels of BOD and COD reported.
Pharmaceuticals	Lead, zinc, mercury, nitrates, chlorides found in groundwater

Pot of pollution

Types of Industries	Groundwater pollution
Pesticides	Groundwater heavily coloured. Nitrates, fluorides, chlorides and presence of heavy metals like chromium, lead, zinc, mercury, arsenic and nickel reported
Fertilizers	Nitrates, fluorides and heavy metals like mercury, chromium, lead found in groundwater
Soft Drinks	Presence of ions of calcium, magnesium, sodium. Groundwater turned yellow, unfit for potable and non-potable uses
Chromite mining	Hexavalent chromium and nickel in large concentrations found in groundwater
Coal mining	Heavy metals like cadmium, arsenic, copper, lead, chromium, zinc and presence of fluorides in groundwater. Numerous wells and borewells rendered useless.
Steel Manufacturing Units	Zinc, iron, manganese, chromium found in groundwater
Aluminium Manufacturing Units	Heavy metals like iron, aluminum, lead, titanium, arsenic, chromium, cadmium, zinc and presence of fluorides reported. Numerous borewells rendered useless.

Groundwater pollution

- Discharge of untreated industrial effluents

  Pulp + textiles + tanneries + pharmaceuticals generate 1,650 mld

Where does all this go….

Where does this go?

	Burden of disease
Fluoride	• Immediate symptoms include digestive disorders, skin diseases, dental fluorosis • Fluoride in larger quantities (20-80 mg/day) taken over a period of 10-20 years results in crippling and skeletal fluorosis which is severe bone damage
Arsenic	• Immediate symptoms of acute poisoning typically include vomiting, oesophageal and abdominal pain, and bloody 'rice water' diarrhoea. • Long-term exposure to arsenic causes cancer of the skin, lungs, urinary bladder, and kidney. There can also be skin changes such as lesions, pigmentation changes and thickening (hyperkeratosis)
Iron	• A dose of 1500 mg/l has a poisoning effect on a child as it can damage blood tissues • Digestive disorders, skin diseases and dental problems
Nitrate	• Causes Methamoglobinemia (Blue Baby disease) where the skin of infants becomes blue due to decreased efficiency of haemoglobin to combine with oxygen. It may also increase risk of cancer.
Salinity	• Objectionable taste to water. • May affect osmotic flow and movement of fluids
Heavy Metals	Damage to nervous system, kidney, and other metabolic disruptions
Persistent Organic Pollutants	High blood pressure, hormonal dysfunction, and growth retardation
Pesticides	Weakened immunity, abnormal multiplication of cells leading to tumour formation Contain chlorides that cause reproductive and endocrinal damage.

Pot of pollutants

- Fluoride, arsenic, iron, nitrate, microbial measured by the Department of Drinking Water Supply

- Deteriorating water quality – 1.66 lakh quality affected habitations in the country

Parliament Question

- March 12, 2010

" Groundwater in 33 per cent of India undrinkable" admits government

Oft missed link: impact on health

Burden of disease

- More than 37.7 million people annually affected by waterborne disease; over 75 per cent are children under 5

- Cases of diarrhoea on the rise

- Nearly 1.5 million children die due to diarrhea

- 66 million people across 22 states at risk due to excessive fluoride in drinking water

- Arsenic a serious problem in six states putting at risk 10 million people

Burden of disease

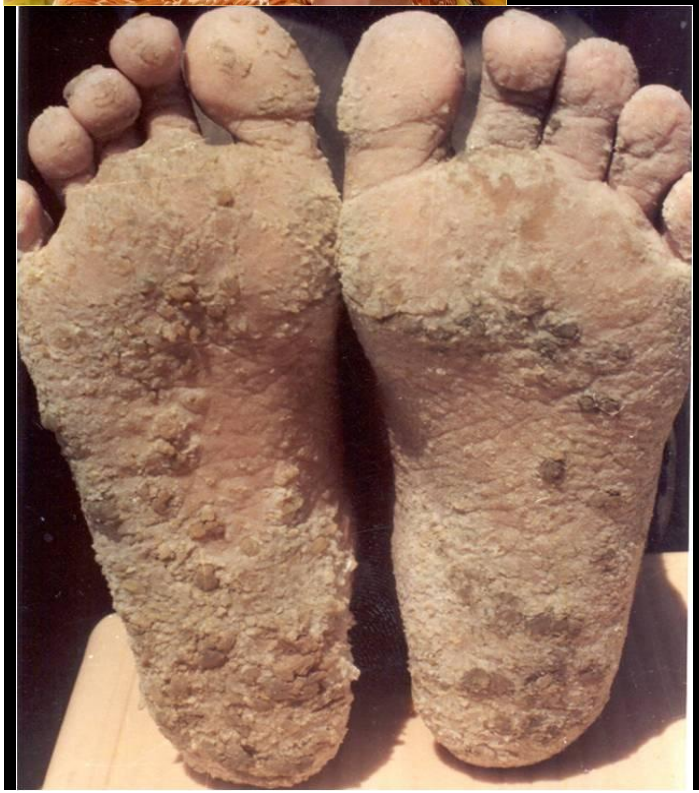
- Annually the rural population spends Rs 6,700 crore on treatment of waterborne disease
- The poor are affected the most: 39 million people pushed into poverty in 2004-05 due to their health expenditure

Generation next?

- Victims of maternal anemia
- Low birth weight, IQ, physical development, performance
- Crippled due to fluorosis
- Disfigured and dismembered due to arsenic poisoning
- Deformed due to organic pollutants
- Old and new age waterborne diseases are on the rise

Generation next, taking on the world?

Burden of disease



Current belief/practise

- Groundwater is forever: CGWA still says there is scope for ‘development of groundwater’
- Groundwater below my land is mine
- Regulation through centralised legislation?
- Deeper is better: already hit arsenic, fluoride, waiting for oil
- Reverse pumping: what cant be seen cant hurt
- Create the problem, then solve it: tail pipe technological fixes

Challenges in groundwater management

- 15,000 monitoring wells – highly inadequate
- Inadequate mechanisms and human resources to monitor water quality
- Improper sanitation and methods of disposal of human wastes also pollute water
- Little accountability

Challenges in groundwater management

- Open access resource: difficult to regulate
- Groundwater pollution not usually visible until detected through monitoring or obnoxious substances actually appear in water
- Solutions for treating contaminated groundwater expensive and time consuming

Finding solutions

- Treat groundwater as a resource, not source
- Protect groundwater for basic needs; Germany, Jambudi Vidi
- Bank groundwater through extensive recharge; use defunct wells and revive traditional water conservation structures

Finding solutions

- Audit: Empower communities technically, financially and legally for social auditing and monitoring pollution and use

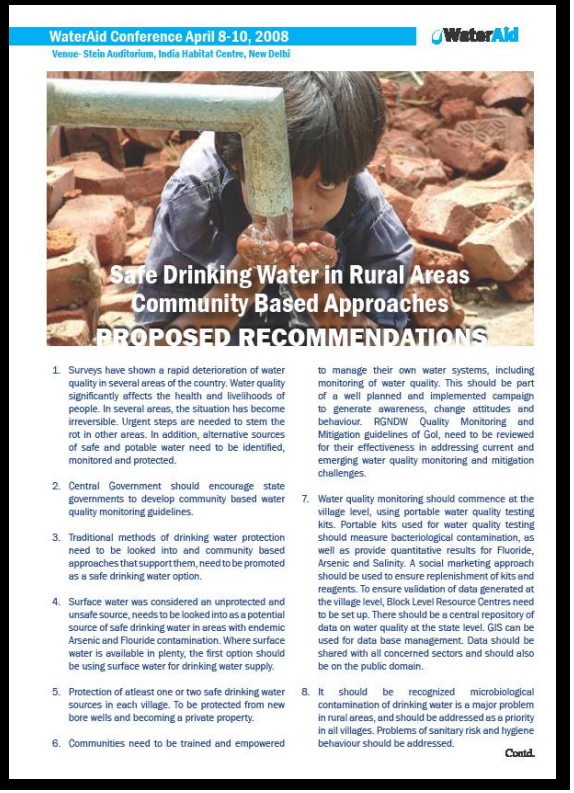
- Audit all water related departments, link expenditure to outcome such as improved water quality; health and poverty alleviation

Finding solutions

- Move to conjunctive use of water
- Relook at legal framework
- Hold users to account: CSR should be beyond existing efforts and reverse pumping
- Hold SPCBs to account
- Sectoral linkages between ministries

Our efforts

- 2008: International conference on safe drinking water in rural areas: Community-based approaches



WaterAid Conference April 8-10, 2008

WaterAid

Venue- Stein Auditorium, India Habitat Centre, New Delhi

Safe Drinking Water in Rural Areas
Community Based Approaches

PROPOSED RECOMMENDATIONS

1. Surveys have shown a rapid deterioration of water quality in several areas of the country. Water quality significantly affects the health and livelihoods of people. In several areas, the situation has become irreversible. Urgent steps are needed to stem the rot in other areas. In addition, alternative sources of safe and potable water need to be identified, monitored and protected.

2. Central Government should encourage state governments to develop community based water quality monitoring guidelines.

3. Traditional methods of drinking water protection need to be looked into and community based approaches that support them, need to be promoted as a safe drinking water option.

4. Surface water was considered an unprotected and unsafe source, needs to be looked into as a potential source of safe drinking water in areas with endemic Arsenic and Flouride contamination. Where surface water is available in plenty, the first option should be using surface water for drinking water supply.

5. Protection of atleast one or two safe drinking water sources in each village. To be protected from new bore wells and becoming a private property.

6. Communities need to be trained and empowered to manage their own water systems, including monitoring of water quality. This should be part of a well planned and implemented campaign to generate awareness, change attitudes and behaviour. RGNDW Quality Monitoring and Mitigation guidelines of GoI, need to be reviewed for their effectiveness in addressing current and emerging water quality monitoring and mitigation challenges.

7. Water quality monitoring should commence at the village level, using portable water quality testing kits. Portable kits used for water quality testing should measure bacteriological contamination, as well as provide quantitative results for Fluoride, Arsenic and Salinity. A social marketing approach should be used to ensure replenishment of kits and reagents. To ensure validation of data generated at the village level, Block Level Resource Centres need to be set up. There should be a central repository of data on water quality at the state level. GIS can be used for data base management. Data should be shared with all concerned sectors and should also be on the public domain.

8. It should be recognized microbiological contamination of drinking water is a major problem in rural areas, and should be addressed as a priority in all villages. Problems of sanitary risk and hygiene behaviour should be addressed.

Contd.

Our efforts

- Community monitoring of drinking water sources
- Pilots for addressing water quality issues
- Recharge of groundwater sources
- Sub-river basin planning and budgeting of water availability and use