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Commentary

Water contamination: The way forward

Water-borne diseases accounts for 6 million deaths and over a billion cases of debilitating diarrhoea annually in developing countries. The latter is largely due to poor sanitation in both rural and urban areas[1]. Geographic information system (GIS) technologies could be applied for evaluation of health impact of water source in urban and rural communities[2,3]. The study by Gopal *et al*[4] in this issue makes a new contribution in this area. The results demonstrate the application of this methodology in a small village setting. GIS overlay approach demonstrated that close proximity of water pipes to sewage, garbage and faecal matter posed an increased risk of infection, confirming earlier findings on a larger scale elsewhere[2]. The risk to water sources was assessed by Coliform counts in water samples.

What do these findings mean? First, the findings are interesting because these demonstrate application of the approach to a relatively very small area of a village community setting, rather than large study areas requiring significant human and material resources. The small scale allows community self-help programmes to undertake such projects in collaboration with universities and local authorities, overcoming the bureaucratic bottlenecks that stifle progress in such matters in developing countries.

Second, the fact that most governmental and international donor programmes do not work well in developing countries in relation to water and sanitation projects raises the question of rational approach. It is time to rethink how aid programmes for provision of water and sanitation are executed in developing countries. The contractor based approach, where governments and international agencies engage people from outside the communities to perform water or sanitation projects creates usually the 'white elephant' project phenomenon, with water sources built but not functional, or toilets that no one uses. In this regard, probably direct funding of individual families and communities to perform the projects by themselves with full accountability might be a better approach.

Third, this paper[4] also highlights the issue of lack of central planning authority for works, water and sanitation. In India, as in most developing countries there are multiple agencies doing the same or similar oversight duties with permits and counter-permits issued for the same purpose with the associated factor of corruption. As a result, permits which would allow water pipelines to run close to sewage could be issued by anyone in an oversight agency. This brings to focus, the need to assure good governance through proper government regulatory oversight duties. A central agency for urban and rural planning, works, water and sanitation, would have one office, issue building and public works permits, using one set of rules and guidelines. The lack of a comprehensive planning approach by government and international donor agencies has led to a very dangerous situation, like the arsenic poisoning in water involving over 76 million people in Bangladesh[5]. It is prudent to add risk analysis to spatial data from GIS, described as probabilistic layer analysis (PLA); such a system has been implemented in other developing countries[2]. Lastly, the key question that is not clear from the study is what one might do with the millions if not billions of people, living without access to potable water in developing countries. The authors had noted that end-user water purification methods may not be sustainable in India. A comprehensive approach is required.

Three basic requirements for such water purification techniques in developing countries must be meet. First, it must be based on a renewable energy supply such as a solar system. Second, it must have minimal mechanical parts to prevent frequent breakdowns and assure easy maintenance. Third, it must be attached to

a decentralized community water supply system with reticulation to a few households of not more than 200 people in close proximity. A decentralized system will permit easy isolation in case of contamination. One plausible option, could be combination of solar energy supply, ultraviolet ray bacterial decontamination methods, and sand/carbon filters to eliminate particulate waste. Innovative designs from universities and entrepreneurs may explore the best possible engineering options for filtration of water. Aside from purification methods, the conveyance through rust and broken metallic pipes also poses a major health risk. The replacement of the metallic water pipes with plastic water pipes should be a major public works project in all developing countries. To address this water related problems, 2010-2020, should be declared the Decade of Water Resources Development, with one of the main focus on the renewal of all major public and household water pipes from metallic to plastic pipes. All international donor programmes in water should commit at least 40 per cent assistance to water projects in this decade. Only such a programme at the level of UN Declaration and at the World Water Forum could make a difference in provision of potable water in developing countries in the next few years. The goal should be that, by 2020 every person living on our planet should have access to potable water. It may be difficult to make simple predictions on future needs for potable water in India.

Governments in developing countries and some international donors have sometimes been misguided, by the link of water-related problems to overcrowding in urban areas, causing some to advocate depopulation as an option. The present study dispels this idea showing that, even in rural villages, waterborne infections were linked to poor planning of water and sanitation and not overpopulation. Industrial progress in India and China in recent years has shown that population growth is the main driving engine for industrial and economic progress. However, population growth in urban cities makes it urgent to provide access to potable water for many urban dwellers. Many developing countries in Asia, Africa and South America are grossly under-populated compared to population density in developed countries. India with a population density of about 300 people per sq km is way behind the industrialized Western countries with population density of 350-500 people per sq km, and further behind Hong Kong with over 5000 people per sq km. The task for the Indian people, should be to improve access to potable water to sustain population growth, needed to enable them catch up with the industrialized Western economies. The population control policies, which account for the bulk of foreign aid is a misplaced priority in developing countries. Rather than spend aid money on reproductive health issues aimed to achieve population control inimical to the interest of the Indian people, these funds could be put to better use for provision of potable water in rural, urban and semi-urban communities. Moreover, healthy growth of population is essential for human capacity development in India, which is the basis for fast track industrialization and economic progress.

At present only a fraction of foreign aid is allocated to water resources development projects. However, the pandemic nature of water-borne diseases and the need for proactive solutions calls for a collective action by developing countries to solve their problems by themselves, using tools such as risk analysis and GIS technologies on a large scale [2,3] and on a small scale basis, as demonstrated in the present study. Maybe, it is about time to call on China, India, Nigeria, Bangladesh, Pakistan, Brazil and other leading Third World Countries to form the Third World Foundation for Water Resources Development, to tackle the array of problems and proffer solutions for sustainable water-supply in developing countries.

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References

1. World Health Organization. *Global water supply & sanitation assessment.* Geneva: World Health Organization, 2000.
2. Njemanze PC, Anozie J, Ihenacho JO, Russell MJ, Uwaeziozi AB. Application of risk analysis and geographic information system technologies to the prevention of diarrheal diseases in Nigeria. *Am J Trop Med Hyg* 1999; *61* : 356-60.
3. Njemanze PC. Satellite technology and aerospace related warning systems (STARWARS) for disease control: a strategy for disease prevention in developing countries of Africa, South America and Asia-Pacific region. *Jpn J Aerospace Environ Med* 1996; *33* : 117-30.
4. Gopal S, Sarkar R, Banda K, Govindarajan J, Harijan BB, Jeyakumar MB, *et al.* Study of water supply & sanitation practices in India using geographic information system: Some design & other considerations in a village setting. *Indian J Med Res* 2009; *129* : 233-41.
5. Chatterje P. Water for life or death. *Development & Cooperation* 1999; (March/April): 28.