

Water Pollution and Epidemics in India: Towards a Sustainable Approach

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ABSTRACT Despite the developments in modern medicine the disease and health situation has not improved proportionately. This is mainly on account of increasing environmental pollution and degradation of various kinds. This paper makes an attempt to examine the correlation between water pollution and epidemics in India in general and Kolhapur city in Western Maharashtra in particular. The author uses the eco-friendly, sustainable approach to tackle it. Finally, the urgent need for developing an integrated approach to urban planning in India is suggested.

INTRODUCTION

Modern man's over concern with industrialization and greed for achieving higher growth rates within the constraints of an expanding population and limited natural resources of the planet has posed serious threats to mankind. These problems are particularly alarming with respect to India, and have attracted the attention of environmentalists. They are of the opinion that this type of urbanization will increasingly lead to concentration of both population and economic growth in cities, further intensifying the problems of the urban environment. Rapid expansion in urban population is exerting pressure on urban infrastructure and services (World Resources Institute et al., 1996: x).

Despite the developments in modern medicine in India, the control on diseases and health situation has not improved proportionately. This is mainly due to environmental pollution of various kinds viz., a) water pollution b) habitat degradation: slums and sanitation problems. c) depletion of natural resources: forests, land and water as also their flora and fauna, and d) air pollution: green house gases, ozone depletion and global warming. Environmental degradation

has three damaging effects: one, it is harmful to human health, two, reduces economic productivity and three, it leads to loss of amenities which are non-renewable (World Bank Report, 1992:44). It has been projected in UNEP reports that around 70 per cent of world's population in developing countries is without safe drinking water and its consequences are visible on human health due to waterborne diseases.

It is with this human health concern that the present study was undertaken to examine the water pollution in relation to waterborne epidemic diseases in India in general, and Kolhapur city in particular. An eco-cultural perspective, health statistics and other secondary data have been used to examine the above correlations. Kolhapur city in Western Maharashtra is taken as a case study to highlight the importance of an eco-cultural approach to health in India. The eco-cultural approach adopted in this study is relevant to understand various issues relating to 'Man-environment-development' in contemporary Indian society (cf. Julian Steward, Forde, Conklin, Geertz, Rappaport, Vayda in Hardesty, D.L., 1977; Rambo A.T., 1985).

WATER POLLUTION AND DISEASE

In India the most common disease associated with water pollution are: bacillary dysentery, acute gastro-enteritis, cholera, jaundice, typhoid, poliomyelitis, roundworm, threadworm, guinea worm, fish tapeworm, etc. (see Naik, S.R., 1977). Major killers among these include cholera and diarrheal diseases. Majority of the infant mortality is attributed to diarrheal diseases which are mainly related to water pollution. There are nearly 1.5 million children deaths a year in India (Bhasin and Bhasin, 1994:54). Among

India's 3119 towns and cities, only 8 have well developed wastewater collection and treatment facilities (Brandon et al., 1993:49). This accounts for the lack of environment management and health planning in India.

An average Indian child below five years of age suffers from 3.3 diarrheal episodes every year which accounts for a total of 20 crore episodes and five lakh deaths annually in this age group. This epidemic disease spreads very fast in a general population through viruses and bacteria present in the medium of water and air. Some of the waterborne viruses are responsible for Hepatitis A and Eo. Hepatitis-A virus rarely causes epidemic, whereas epidemic is caused by the hepatitis E virus. This virus spreads from person to person *via* fecal contamination of water and food (see Naik, 1997: 66-67). The available data related to hepatitis-E epidemic reveal that since 1973 onwards there has been a frequent reoccurrence of this disease.¹

Developed countries have controlled epidemics through provision of safe potable water, effective sewage disposal and public health programmes. However, developing countries, especially India has neglected the importance of maintaining a clean environment as a basic strategy. Although, some attempts have been initiated by the Central and State Pollution Control Boards since 1976, strict conservation and management strategies have been largely ignored. In addition, importance of people's awareness and practices at the group level have not been taken into consideration.

KOLHAPUR: A CASE STUDY

The population of Kolhapur during 1981 was 3,40,625 and since then it increased to 4,05,118 during 1991. At present, it is a city of more than 5 lakhs population located in the

Western Maharashtra region. Kolhapur is about 500 kms south of Bombay on the Bombay-Bangalore National Highway No.4. It is a historical city famous for Mahalakshmi temple dating back to 700 A.D. (Kolhapur Municipal Corporation Report, 1996). It was a princely state and was nurtured and developed economically, socially, culturally and educationally by Chhatrapati Shahu Maharaj. He was one of those who laid the foundation for the Non-Brahmin movement in Maharashtra. Phule and Ambedkar were the other luminaries of the Non-Brahmin social movement in Maharashtra. Kolhapur has a boon of Panchganga river (five rivers) which is a composite of five tributaries: Vedganga, Dudhganga, Kumbhi-Kasari, Bhogavati, and Sarswati which is an interrupted tributary. Commercial cultivation of sugarcane has been promoted by the co-operative sugar factories at Warana, Kolhapur, Kuditre, Kagal, Bhogawati, Asurle Porle and Ichalkaranji and this has brought economic prosperity in the region. In addition, small scale engineering products, jaggery, grapes, and Kolhapuri Chappalas are locally produced and marketed even to foreign countries. Labourers and poor people from backward districts of Karnataka and Maharashtra have migrated into the city for employment. The Shivaji University and its affiliated colleges in Arts, Science, Commerce, Social Work, Medicine and Engineering have attracted students from distant states like Andhra, Kerala, Panjab, Haryana, Jammu Kashmir, Bihar, Delhi and other states. The projected figures of population of the city are 6,20,500 for the year 2011 and 7,65,200 for the year 2020 (ibid:4-5).

The city's population has spread out in a radius distance of 10 kms from the centre of its city namely Mahalakshmi temple. Water is supplied by the following three different pumping stations and sources:

Kalamba Lake

This lake was constructed during 1881-84 by Shahu Maharaj and arrangements for providing filtered water were also made then. During those days this was something unique for Kolhapur as compared to the other Indian cities. This lake supplies 8 million litres of water per day and caters to the requirements of selected wards. Due to un-

1. Among the city populations that were hit by this problem were Gulmarg in 1978 (20,000 persons), Jammu in 1981 (205 persons), Hardwara in 1981 (11,000 persons), Ahmedabad in 1975 (2572 persons), Delhi in 1955 (29,300 persons), Kanpur in 1991 (record figure of 79,000 persons) and even a small city such as Kolhapur in Western Maharashtra 1161 persons were affected in 1981 (ibid:67). The actual epidemic affected people is much higher than this number indicates.

certain monsoon during the last five to six years, the water level in Kalamba lake has been unable to fulfill the increasing demands of the growing city. Pollution problem of this lake is comparatively less acute and this can be attributed to its location away from the main city.

Balinga-Nagdevwadi Pumping Station

These two stations, the first along with a filtering station at Chambhukhadi was constructed during 1948, and the second during 1985. The two together supply 41 million litres of water everyday to selected areas of the city. These pumping and purification stations are located on the banks of the Bhogavathi river. These upstream stations and areas are relatively free from pollution of human sewage which flows into the Panchganga river directly as compared to a few downstream areas in the city of Kolhapur. However, the effluents from the three different sugar factories on the river banks, open field system of toilet in the rural areas, absence of drainage and sanitation and excessive use of pesticides and fertilizers, pollute the water of the rivers to a large extent, especially during the monsoon period.

Kasaba Bavada

Due to the increasing demands of water supply, the Maharashtra Government Water supply and Purification Board constructed a supply station at Kasaba Bavada in 1975. It is located on the banks of Panchanganga river and is 8 kms from the heart of the city. This water supply station provides 36 million litres of water everyday. A total of 85 million litres of water is supplied to the city population by the above three sources.

POLLUTION CRISIS: THE BANE OF ECONOMIC AND URBAN GROWTH

There are two large canals carrying human waste, namely Jayanti Nala and Dudhali Nala. These canals pass through the central areas of the main city and discharge their effluents directly into the Panchanganga river which encircles and flows around the city and finally moves towards the Kasaba Bavada filtering station. The most surprising and tragic thing is that this wa-

ter in-take pump house is just 2 kms upstream from the point where the sewage canals dump the chemical pollutants and disease producing bacteria and viruses. The existing capacity of this sewage treatment plant is limited and as such it is overloaded and inefficient. The Jayanti Nala dumps around 50-55 ML of sewage per day into the river, while Dudhali Nala discharges about 15 ML of wastewater per day. The levels of human coliform bacteria in the drinking water is thus increasing thereby endangering the health of the people in the city. The problem is most acute during rainy season when the sewage canal overflows the sewage treatment bridge and flows into the river.

The second kind of pollution of the river which indirectly affects the drinking water supply in the city can be attributed to the effluents from the sugar industries. There are as many as three sugar factories which pollute the Bhogavati river at different points on its downstream course towards Kolhapur. The effluent from the sugar industries mainly comprises of molasses as also the spent-wash (referred as *Malicha pani*) from distillery plants. Among the above mentioned pollutants, the spent wash is very harmful to aquatic ecosystems. In addition, COD and BOD values are also very high. This spent wash also contains high concentration of chlorides, sulphates, nitrogenous compounds, phosphates, potassium, sodium and calcium salts. (Patil, 1994).

Water Pollution-Epidemic Correlation

Kolhapur has already been on the hepatitis epidemic map of India. In fact, the official figures do not take into account the affected patients approaching the private doctors. There are about 4,000 private practitioners which workout to an average of 1 doctor per 125 persons. Table 1 shows the different types of epidemic outbursts in the district from 1987 to 1996.

These figures are the official figures of the Health Department of Zilla Parishad, Kolhapur. They do not include the patients approaching the private practitioners. The figures from this table indicate that Cholera cases were maximum (2073) during 1992, followed by Gastro enteritis (1439) during 1994 and Jaundice (953) during 1991. Gastro-enteritis resulted in maximum number of deaths (39) during the last 10 years

Table 1: Epidemics in Kolhapur from 1987 to 1996*

Year	Cholera		Gastro		Diarrhea		Amoebiasis		Jaundice		Fever		PUO	
	Infe- ction	Death	Infe- ction	Death	Infe- ction	Death	Infe- ction	Death	Infe- ction	Death	Infe- ction	Death	Infe- ction	Death
1987	6	-	1	1	-	-	-	-	1	1	-	-	-	-
1988	12	1	963	6	-	-	-	-	60	-	-	-	-	-
1989	-	-	-	-	-	-	-	-	596	3	258	-	-	-
1990	30	-	1	1	37	2	-	-	47	2	62	-	237	-
1991	60	6	190	10	421	4	-	-	953	4	296	-	-	-
1992	2073	15	595	4	962	3	86	-	46	2	95	-	23	-
1993	479	-	684	3	635	5	-	-	11	-	207	-	205	-
1994	-	-	1439	10	507	-	-	-	101	-	213	-	-	-
1995	-	-	1049	4	392	-	-	-	-	-	-	-	719	-
1996	-	-	424	-	401	-	18	1	155	-	67	-	83	-

Source: * Health Department, Zilla Parishad, Kolhapur. (These figures exclude the cases referred in private hospitals and dispensaries of the city).

period as compared to Cholera (20), Diarrhea (14) and Jaundice (12).

There has been some public awareness about the problems of diseases and they attribute this to the pollution of river water through *Malicha pani* (molasses and spent-ash from sugar factory). Newspapers such as, Pudhari, Sakal, Kesari and Tarun Bharat are playing crucial role in highlighting the problems of water pollution as also for protection of Rankala lake due to its heritage value and invaluable aquatic eco-system. Thus the local media has served as a link between the Municipal Corporation/Water Supply and Purification Board of the Maharashtra State Government and the Public. This public awareness had led to larger participation of students, women, social workers, activists, environmentalists and even the common man. During last year, the Kolhapur Municipal Corporation (KMC) and its machinery, along with the media, local leads and the youth of different Yuvak Mandals have joined together to deweed the water of Rankala lake.

These environmental health problems in Kolhapur city and public awareness have led the KMC under the guidance of the Maharashtra Water Supply and Purification Board to initiate an alternative water supply scheme for this city. The Plan is known as 'Kalamwadi Direct Pipe line' or Dudhganga Project. The estimated cost of this plan is Rs. 120 crores which proposes to bring potable water directly through gravity pipes from Kalamwadi. The length of the pipelines is 48 kilometers. However, as the water flows towards Kolhapur it gets continuously polluted.

Sewage water is a major factor which pollutes the Bhogavati river water.

This proposed water supply project is divided into two phases. The first phase consists of installation of 48 kms of pipeline, while in the second phase construction of water purification tanks and other aspects of the distribution system, repairs, etc. will be undertaken (see Kolhapur Municipal Corporation Report 1996:4). During 1997, a Public Interest Litigation (PIL) was filed by a few citizens against the Kolhapur Municipal Corporation. The Supreme Court gave a judgment in favour of the citizens and has directed the KMC to complete its direct pipe line plan of providing clean river water within a stipulated period i.e. by 2002 A.D. However inspite of this judgement conflicting interests regarding the route of the direct pipeline, political interference and funds availability and their judicious use will be some of the problems in the implementation and timely completion of the project. According to the latest developments in the city, the Phase I, Part I, namely installation and expansion of pipeline networking is in progress. The Municipal Corporation is optimistic that it will complete this phase by 1999. The present water rates may also be increased in order to collect funds as well as to increase public participation.

TOWARDS A SUSTAINABLE APPROACH

An analysis of the above case study reveal that we can strongly recommend to both the state and central governments, and also to the local bodies like the Municipal Corporation, Zilla

Parishad, Taluka Panchayat and Gram Panchayats, that projects related to providing unpolluted wholesome drinking water, closed drainage system, latrines, clean streets and roads, waste disposal and treatment plants, etc. must be taken up as a top priority area. Among the above mentioned recommendation, providing clean potable water should be at top priority. Pollution problems have been totally neglected by the Municipal Corporation at this juncture. This problem needs to be given attention.

It was felt that this can be achieved by environmental awareness at the group levels. There is a need to see how environmental awareness gets translated into action and sustainable practices in day to day life. A constant and constructive dialogue between the Municipal Corporation officials, social workers of Voluntary Organizations, citizens, newspaper media personnel, engineers, urban planning experts, doctors, environmental experts and sociologists from the Shivaji University needs to be promoted. Possible alternatives and problems need to be discussed for arriving at a common solution.

This case study also indicates the importance of urban planning in the neglected cities of India. Long term urban planning with a holistic perspective is an urgent need. Social scientists need to develop an integrated urban planning model which takes into account parameters and inputs like a) population growth rate b) water pollution levels and its correlation with diseases c) water pricing techniques d) sewage and waste treatment technologies and disposal system e) housing, sanitation and equitable water supply in the slums and other poor localities f) inclusion of youth and women from various localities in the planning process g) promotion of environmental education and communication and h) inclusion of multi-disciplinary experts in the local planning bodies.

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