
Urbanization and health

Urbanization and water, sanitation and hygiene in Bhutan

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Introduction

Bhutan has followed a conservation-centred development policy that has been crucial in maintaining a good natural resource base. The forest coverage is about 72%; it has mountainous topography with altitude varying from 100 metres to over 7500 metres above sea level. The precipitation varies from 5000 millimetres (mm) in the foothills to 700mm in the high altitude region. Fed by snow and rain, the country is drained by four major river basins and their tributaries. The average flow draining the whole country is estimated at 2325 cubic metres (cu m) per second, which works out to 73 000 million cu m per year with per capita availability of more than 100 000cu m.¹ The Royal Government of Bhutan has made remarkable progress in human as well as economic development since it started planned development in the early 1960s. The government is committed to maintaining harmony between economic development, spiritual and cultural values and environment conservation. The development philosophy adopted by the government is based on "Gross National Happiness".

Water is crucial for development and for the well-being of people, as well as for achieving the national goal of "Gross National Happiness." Even though Bhutan has a fairly large quantity of fresh water it cannot afford to be complacent. The country faces a number of challenging issues in water resource

management due to the expansion of industry and agriculture, and urbanization. The national population growth rate of Bhutan is 1.3%, which means that its population will be double in fifty years. Even though the national growth rate is only 1.3%, the urban population growth in Bhutan has been unprecedented. It is estimated that by 2020, 50% population would reside in urban areas. Moreover, the recent trend in urban growth indicates that by 2020 the urbanization level would be about 73%². Rapid urbanization and economic growth would mean an increase in water demand to satisfy domestic and agriculture needs. At the same time, however, the water sources are either drying up or are getting depleted. Thus, the additional water required has to be abstracted from the environment. This would mean more water abstraction, more water treatment, more consumption and finally more wastewater discharge into the environment.

Although freshwater is in abundance in Bhutan, the pressure on it is bound to increase with growing urbanization and industrialization. The urban population in 1999 accounted for 21% of the total population and is likely to increase by 50% by the year 2020, which will raise the demand for water in urban centres³. Local and seasonal water shortages are becoming more frequent, and there is evidence of increasing sediment loads in Bhutan's extensive river system⁴. The latter is a threat to the rapidly-growing hydropower industry that needs a reliable water supply to sustain the much-needed revenue that currently

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underwrites about 45% of Bhutan's development budget. Despite all the challenges, there has been a significant increase in access to safe drinking water — from 45% of the total population in 1990, to 78% in 2000. While no legislative framework on water supply and related rights is in place, the Bhutan Water Vision, the Water Act and Water Policy are being formulated to create an enabling environment for an integrated and efficient management of water resources.

Country profile

The following are some of the key demographic indicators of Bhutan:

Area (square kilometres - sq. km):	38 394
Population (2005-2006)	683 982
Life expectancy (2005-2006)	66.1 years
Infant immunization coverage (2008)	90%
Literacy rate (2005-2006)	59.5%

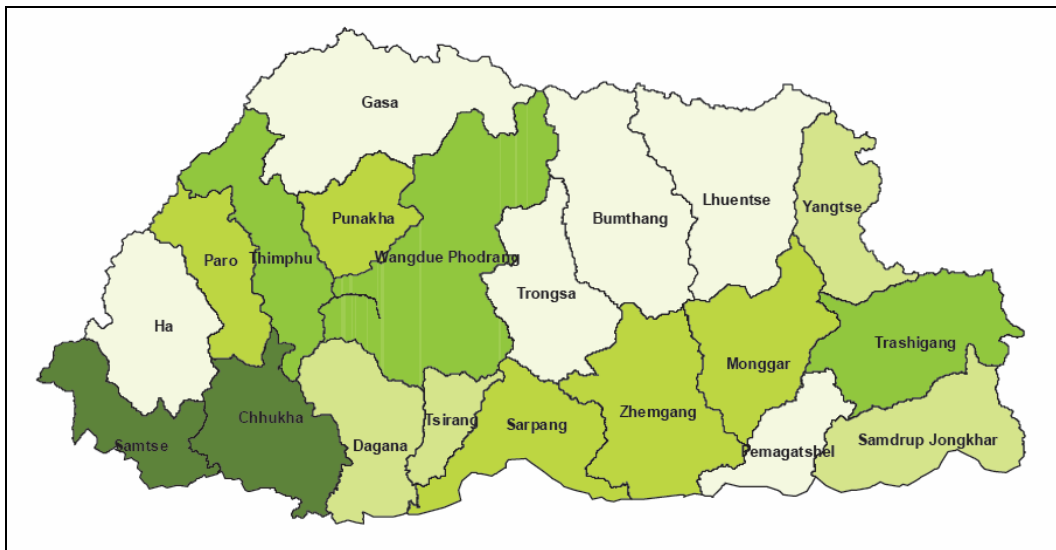
Taking the social and economic conditions into consideration, the Human

Development Index (HDI) ranking for Bhutan in 2005 was 133 out of 177 countries⁵.

Institutional set-up for urban water supply and sanitation

Urban development in Bhutan was initiated in 1983 through the Asian Development Bank (ADB) and the Danish International Development Agency (DANIDA) that provided support to urban water supply and sanitation to six major towns. It was the first-ever multicredit facility obtained from ADB to improve urban water supply and sanitation. It was to be executed through international bidding for supply of equipment and civil work. Ever since, there have been continued investments in urban water supply and sanitation areas supported by the governments of Bhutan, Denmark and India and by multilateral institutions like the World Bank and the ADB. The overall achievement of urban water supply and sanitation sectors is largely accredited to the Government of Denmark and other bilateral and multilateral partners⁶.

Figure: *Map of Bhutan*



The Ministry of Works and Human Settlement (MoWHS) is the pivotal agency to formulate strategies and policies for human settlement in the country. Within this ministry, the Department of Urban Development and Engineering Services (DUDES) is the Central Government agency responsible for executing the urban water supply and sanitation programme. Service-oriented municipal corporations have been established in the two biggest urban centres, namely Thimphu and Phuentsholing⁶.

The Thimphu Municipal Corporation enjoys the highest degree of autonomy with the Municipal Charter granted to it in 2003 as per the Bhutan Municipal Act of 1999. Phuentsholing, the second largest town was granted financial autonomy for water and sanitation in 1996 and is now gearing up to receive the Municipal Charter similar to the one granted to Thimphu Municipal Corporation. In other districts, municipal corporations that provide municipal services to urban residents have been established. These smaller municipal authorities are placed under the district administration for their routine functioning and management of services. Urban water supply and sanitation projects are planned and designed by the central agency but are often implemented by the district administration with technical backstopping from the central department.

The Royal Government of Bhutan has enacted various acts, policies, rules and regulations, and codes to enable effective and efficient urban water and waste management.

Water supply and sanitation coverage in urban areas

Bhutan consists of twenty districts and about 69% of the population lives in rural areas. Urban areas consist of 54 towns. Almost all towns are supplied with piped drinking water.

The recently-published World Health Organization (WHO)/United Nations Children's Fund (UNICEF) Joint Monitoring Programme (JMP) report indicates that in 2008 urban water supply coverage in Bhutan was 99%. Water supply facilities have reached almost all households in urban Bhutan. However, water supply is still irregular in most towns mainly due to the rapid growth of urban population. The expansion of water supply and sanitation systems is not commensurate with the rapid population growth. Therefore the limited water supply has to be stretched for a larger population, which leads to rationing of the supply. Another problem associated with insufficient water supply is the high water loss in the system due to breakage of old pipes and sometimes illegal tapping by some residents (Table 1).

Table 1: Water loss in Thimphu city water supply system (2006-2010)

Year	Percentage loss
2006-2007	28%
2007-2008	27%
2008-2009	25%
2009-2010	23%

The major water quality problem is with microbiological contamination. Most urban water supply systems in Bhutan have a basic water treatment facility. However, due to lack of monitoring of water quality, inadequate treatment facilities, and poor maintenance of the system, water that flows from taps is not always safe to drink. The majority of residents in urban areas either boil or filter the tapwater before drinking.

The urban sanitation coverage stands at 88%. Only five towns have sewerage treatment plants. However, only about 30% households in these towns are connected to sewerage treatment plants. The rest are all connected to septic tanks or traditional pits. The toilets in towns without sewerage treatment

plants are connected to septic tanks. There is every possibility of sewage from the septic tanks and pits seeping into the groundwater and rivers, thereby polluting the fresh water sources.

With rapid economic and population growth in urban areas, and changing lifestyles, Bhutan is facing increasing challenges in managing solid waste. Concerns of unsatisfactory disposal of solid waste in some of the bigger urban towns have been noted in the recent years. A person in urban Bhutan produces about 0.25 kg solid waste per day.

A study conducted in 10 towns in 2007 revealed that organic waste formed the largest proportion of municipal solid waste with 58.05%.

Not all towns in Bhutan have a solid waste management system. Some of the bigger towns have municipal waste collection services. But in places where such services are not available, waste is disposed of in small garbage pits and burnt. While some waste is burnt in open spaces, a good section of people dispose the waste in the streets, drains, rivers and streams, and bushes. Some towns use landfill sites to dispose of municipal waste but none qualify as a sanitary landfill as the standard norms are not followed. All such actions lead to pollution of the environment, especially the air, water bodies and open spaces.

Developing human resources in municipalities and setting up proper waste management systems would go a long way in preserving the pristine environment that ultimately improves the quality of life. The high organic content of urban solid waste gives opportunity to explore composting as an option for managing waste in a more eco-friendly manner. Municipal authorities are also looking at the means of segregating waste at the point of generation and implementing recycling or reusing wherever it is relevant.

Impact of water and sanitation on health

Water, sanitation and hygiene are the foundations of good health. It is estimated that 88% of diarrhoeal deaths worldwide are attributable to unsafe water, inadequate sanitation and poor hygiene. Some of the waterborne and water-related diseases prevalent in urban Bhutan are diarrhoea, typhoid, skin infections, conjunctivitis, dengue and malaria. With improvement in the health care system combined with increasing access to water and sanitary facilities, diarrhoeal mortality especially in under-five children has reduced drastically in the past decade. However, decrease in diarrhoeal morbidity has not been significant. The reasons for this could be water safety issues and unhygienic practices. For instance, typhoid cases are reported every year from various towns during monsoons — a typhoid outbreak was reported in Damphu town in 200. The Department of Public Health that investigated the outbreak gave clear evidence of the main cause being water contamination at the source and during distribution of water in the system due to broken pipes and lack of treatment facility.

Dengue was reported for the first time in Bhutan in July 2004; 2579 suspected dengue cases were reported in the outbreak in 2004. Since then, several cases have been reported every year especially from Phunstholing town. The dengue-causing mosquito breeds in clean and stagnant water easily found in homes such as flower pots, water tanks, old tyres, rainwater gutters, or water collected in any small containers. Therefore, proper storage and management of water at home and in surrounding areas is very important in preventing dengue. Table 2 presents the incidence of the top ten diseases in Bhutan in 2008⁷.

Table 2: Top ten diseases in Bhutan, 2008

Sl. No	Name of the disease	Numbers in 2008
1	Common cold	266 164
2	Skin infections	97 514
3	Peptic ulcer syndrome	63 039
4	Musculo-skeletal	61 001
5	Acute pharyngitis/tonsillitis	60 510
6	Other disorders of the skin and subcutaneous tissues	59 335
7	Diarrhoea	58 537
8	Other diseases of the digestive system	54 859
9	Other respiratory and nose diseases	51 145
10	Conjunctivitis	37 240

Table 3 indicates the number of waterborne disease cases in the past five years⁷.

Table 3: Waterborne diseases in the past five years (2004-2008)⁷

	Name of disease/infection	Year and number of cases reported				
		2004	2005	2006	2007	2008
1	Cholera	27	29	38	5	18
2	Typhoid	2 148	2 948	2 871	2 055	1 927
3	Diarrhoea	69 539	67 301	70 939	64 100	58 537
4	Dysentery	31 110	31 404	31 631	26 601	24 411

Challenges

The following are the challenges:

- (1) Water quality data assessment and management is lacking for urban centres. It is very important to have a water quality information management system for all urban centres as it would help in proper water resource planning and allocation in urban areas.
- (2) Human resources: Human resources and capacity building have always been big challenges in the context of urbanization. With increasing population, the pressure on the existing urban infrastructure is also increasing. The municipal offices are usually not manned with adequate and qualified staff. The municipal in-charge/engineers or lower-level staff who shoulder responsibilities have in fact little or no formal training.
- (3) Funding: In most developed countries important projects are not restricted to the funds available whereas in Bhutan, the scarcity of financial resources acts as a limitation to infrastructure development. With urbanization, the government will have to prioritize water and sanitation activities.
- (4) Proper solid waste management strategies: Landfill is currently the most preferred alternative for waste disposal by local municipal authorities as it is still the cheapest and easiest method of getting rid of wastes away from towns ("out of sight, out of mind"), in the absence of strict environmental regulations on landfill disposal. Recycling infrastructures are an essential component of integrated solid waste management for resource recovery and for reducing wastes going to landfills.
- (5) Operation and maintenance of urban infrastructure: Even though the coverage of water and sanitation infrastructure in Bhutan is good, its functionality still remains poor. Urban centres should implement approaches and tools that help to improve water quality and quantity, and eventually the sustainability of water supply and sanitation systems.
- (6) Availability of better alternatives: In order to provide an urban infrastructure, it is important to have many alternatives in terms of cost-effectiveness, sustainability and efficiency.

Conclusion

While health is an important component for the growth and development of any country, the lack of safe drinking water and poor sanitation in Bhutan contribute to widespread and recurring health problems. In order to tackle this problem, the government allocated 8% of its 2008-2009 budget to improve the health services, both in terms of their quality and accessibility, as improving health is seen to be central to the achievement of the national vision of “Gross National Happiness”.⁸

As a result of the high priority accorded by the Royal Government of Bhutan to providing access to safe drinking water and basic sanitation, the country has made sustainable progress in providing these services in both rural and urban areas.

Safe, adequate and accessible supplies of water with proper sanitation are the

foundation and an essential component of primary health care. Insufficient provision of safe drinking water and sanitation results directly and indirectly in communicable diseases, health risks, poor health and environmental pollution. Bhutan has always considered water and sanitation as one of the basic primary health care components that contributes directly to “Gross National Happiness” and is also a very important indicator of progress made towards achieving the Millennium Development Goals (MDGs). Therefore, the goal of achieving universal access to adequate safe drinking water in the Tenth Five Year Plan has been accorded the status of one of the top three priorities of the new government. Ever since the water supply and sanitation programme started in 1974, sanitation has always been part of the water supply component. Therefore developments in the area of sanitation have to be viewed in the overall context of developments in the area of water supply.

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