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Scarcity of Water for Domestic Consumption in Cherrapunjee

Bhogtoram Mawroh
and Zahid Husain
North-Eastern Hill University,
Shillong- 793022 (Meghalaya), INDIA
Email: mawroh_bhogtoram@rediffmail.com

Abstract

Shortage of water for the fulfillment of the multifarious human needs, especially domestic needs of drinking, cooking, hygiene and sanitation has to be addressed before any meaninful improvement can be made to the human well being. Cherrapunjee suffers from a paradoxical situation of surplus atmospheric moisture but acute shortage of water for domestic purpose. The paper has tried to identify the pattern of water shortage in Cherrapunjee by looking into the water collection from the different sources by the households. Analysis of the data on collection of water by the households reveals that they get 70 lpcd during the rainy season due to availability of rain water but it drops to 50 lpcd during the dry season. It simply indicates scarcity in plenty. The status of water supply infrastructure, status of the water sources during the different seasons, distance of the sources from homes, and economic status of the households are important factors that are found to determine the amount of water collection. However,

Zahid Husain and L. Cajee (Eds.)
Water Crisis in the Indian Subcontinent,
Bookwell, Delhi, India (2011): 467-486.

of all factors the size of the households has been found to be the most important factor in determining the lpcd. The paper deals only with the quantitative aspect of water scarcity leaving the qualitative aspect for future work.

Keywords: Water scarcity, domestic water, water collection, per capita availability.

Introduction

Although 1400 million km^3 of water is present on the earth at any given point of time, less than one per cent can be utilized by man for fulfilling his needs for survival, food production, industrial development, energy generation etc. The rest of the water is too salty, too deep for exploitation and locked in the ice caps. Proper utilization and management of the amount that is available is very important to avoid the problems of water shortage and water scarcity. The problem of water shortage and water scarcity is particularly very severe in the arid and semi arid areas because of unfavourable climatic conditions. Around a billion people are out of reach of clean water (Human Development Report, 2006) with the majority of them living in the developing countries (POST, 2002). About 436 million people in 29 countries were found to be suffering from water stress or scarcity in 1995. The World Bank has projected that this figure will go up to 1.4 billion by 2025 and would cover the areas in Pakistan, South Africa and large parts of India and China where water is not currently scarce (POST, 2002). However, there are certain areas of the world that suffer from problem of water scarcity despite enjoying favourable climatic conditions. This is true of Cherrapunjee which despite receiving the highest amount of rainfall in the world suffers from scarcity of water for domestic purposes.

Conceptual Background

In recent years, there has been a growing perception of a looming water scarcity (Iyer, 2003: 257). The concept of water scarcity deals with both the quantitative as well as qualitative aspect of water availability. Meeting basic human needs, i.e., drinking, cooking and sanitation, and protecting valuable ecosystems are the prime functions

of water (Gleick, 1996) and once these needs are fulfilled the challenge is to use the remaining water to satisfy human needs efficiently, equitably and productively (Postel and Vickers, 2004). Hence, the quantity of water available should be adequate for economic and social needs as well as for the water requirements for human and natural ecosystems. Degraded water resources cannot be utilised by human or natural systems (Pereira et al., 2002). Water scarcity is the mismatch between availability and demand, both in terms of quantity and quality in space and time (Winpenny, 2003; Murthy, 2007). According to Hardy (2003) when the population of an area uses more than 20% of the renewable supply it create conditions for water scarcity.

The terms like water scarcity, water shortage and water stress are commonly used interchangeably but they have their distinct meaning. Water shortage is the absolute shortage of water for meeting the basic needs while water scarcity is the imbalance of demand and supply of water under prevailing institutional arrangements and/ or prices and hence is a relative concept. Water stress is but the symptoms of water scarcity and shortage (Winpenny, 2003).

Attempts have been made to fix benchmarks for identifying water scarcity. When the water availability in a country/ region drops below 1000 m^3 per person per year it is said to be experiencing water scarcity (Pereira et al., 2002; Winpenny, 2004). In case it is below 500 m^3 it is a case of severe water scarcity. Pereira et al. (2002) kept 2000 m^3 as the threshold as under these conditions the population would face very large problems if a drought occurs, while Khroda (1996) kept the threshold level at 1700 m^3. The water availability of a region, apart from its annual renewable sources, is also derived from desalination, use of non-renewable ground water resources and of waste water re-use to compensate for the scarcity (Pereira et al., 2002). Traditionally, the measure of water scarcity has been the per capita availability but now actual water use has become more representative of actual human well-being (Gleick, 1996). The population of an area may have access to adequate amount of water but if the iron content in the source is high, the taste of water would invariably force the users to turn to alternative sources that may not be safe. There is a significant difference between access to a given resource and 'actual' use (Planning Commission, 2002).

Water scarcity might be due to natural causes, i.e., aridity, drought or may be due to human activities, e.g., desertification, water shortage (Pereira et al., 2002). The factors that have led to an increasing pressure on the water resources and result in water scarcity conditions are expanding urban areas, i.e., urbanization, rising income, population growth, increase in industrialization (Planning Commission, 2002), annual fluctuations, exhaustion of traditional sources, cyclical shortages in times of drought, lack of resources to develop water supply and management, inefficient agricultural practices, water pollution, international conflict (POST, 2002), climate change and variability, modification of landscape and land use and failure to manage demand (Winpenny, 2004). Murthy (2007), apart from increasing demand in different sectors, has also included tapping of easily available water, the delay in future project implementation due to increasing social and environmental awareness and increased inhuman development activities that lead to contamination of available water resources as the prime causes for water scarcity. When care is not taken to conserve water, avoid wastes, preserve quality and prevent the misuse of water even regions enjoying abundant rainfall can suffer from water scarcity (Pereira et al., 2002).

Water for Domestic Consumption

Of all the different uses that water is put to, water for domestic purpose is the most important as it connected with the survival of man. The World Health Organisation has defined domestic water as being "water used for all usual domestic purposes including bathing, consumption and food preparation" (Howard and Bartram, 2003). Gleick (1996) identified domestic water as '*basic water requirements*' and defined it in terms of quantity and quality of water for the four basic human needs of drinking water, water for human hygiene, water for sanitation services and modest household needs for preparing food. Garland (1997) considers them as '*primary domestic activities*'. The failure to provide water for these purposes would lead to human suffering and misery and contribute to social and military conflict. Domestic water influences particularly health and productivity (Howard and Bartram, 2003).

The amount of water used for domestic purpose depends on climate, accessibility, i.e., distance and time (Glecik, 1996) and also includes reliability and potential cost (Howard and Bartram, 2003). The cost of water is not a limiting factor for affluent households but for poor households it may lead to readjusting their demand requirements by limiting water allocation in some domestic needs like sanitation, hygiene and food preparation. Reliability is also important if the interruption in the supply is unpredictable (Howard and Bartram, 2003). In India, the minimum amount of water needed for fulfilling the domestic activities has been kept at 40 litres per capita per day (lpcd) (Planning Commission, 2002). Howard and Bartram (2003) have identified the minimum level to be 20 lpcd which is accepted by the United Nations (Human Development Report, 2006). Whereas, Gleick (1996) suggested the minimum level of 50 lpcd independent of climate, technology and culture. Based on their work in the East African countries of Kenya, Uganda and Tanzania, White, Bradley and White (1972) have argued that for making global estimates the figure should range from a conservative 12 lpcd to 20 lpcd.

Wide differences exist between water consumption levels at the national as well as international level. These differences can be among different income groups, social categories, regions and between industrialized and developing countries. In U.K., the households use only about 70% as much water as the most water thrifty Americans do for domestic activities. Indoor water use in U.S. homes is estimated to average 262 lpcd, while households that install water efficient fixtures and appliances that reduce leakages use only 151-170 lpcd (Postel and Vickers, 2004). While discussing about the water supply systems in Africa, Khroda (1996) found staggering variations from country to country within the African continent. The daily level of water-supply services varied from a low 15 lpcd in Angola to a high about 270 lpcd in Madagascar; in the rural areas, the average water consumption varied from 20 lpcd to 40 lpcd. Urban areas show a higher level of domestic water consumption than the rural areas. According to Milne (1976), apart from the usual indoor activities (drinking, cooking, and bathing), residential water uses in urban areas also include the outdoor activities like lawn watering, car washing

and swimming pool which are generally not so prevalent in the rural areas. While investigating into the residential water consumption in the urban households of the U. S. Milne (1976) constructed a residential profile of water use in which the water consumption of 530 lpcd in the urban centres of the U. S. was divided into 265 lpcd for indoor activities and 265 lpcd for outdoor activities. Sanitary needs consumed about 45% of the water meant for indoor activities. Even within the urban centres there are great variations in water availability. In India some centres like Tuticorin are getting as low as 9 lpcd while some areas like Tiruvannamalai are getting as high as 584 lpcd. Out of the 401 Class II towns, 203 have low per capita supply of less than 100 lpcd (Planning Commission, 2002). Water consumption in Shillong was found to be 43 lpcd (Chakraborty, 2006).

Wealth and location are important determinants for access to water in most of the urban centres of the developing world (Human Development Report, 2006). Because of poverty, water distribution and sewerage systems are not well developed (Pereira et al., 2002) and the poor households have to depend on unsafe water sources and risk diseases. This link between poverty and water borne diseases have led Horan (1997) to suggest that the number of taps per head of population is a better indicator of health than the more classic indicators such as the number of hospitals. Even if water is available through a common standpipe the supply is insufficient and erratic and the price paid is a multiple of those charged for water into households (Human Development Report, 2006). Low income and poor city dwellers that are not connected to water systems often turn to alternative and costly supplies, such as water vendors who may charge many times more than customers pay for piped service (Planning Commission, 2002; Postel and Vickers, 2004). For example, the poor in Delhi pay informal vendors 4.50$ per cubic metre of water, nearly 500 times paid by those with a house connection and in Manila it is 42 times more (Postel and Vickers, 2004).

In rural areas safe, accessible and affordable water brings a wide range of benefits, education and livelihoods (Human Development Report, 2006). Also gender inequity is more pronounced in the rural areas as it is the women who collect water. Because of the traditional social structure and hierarchies, women and children, especially the

girl children, have to bear the brunt of the problem of lack of access to water (Planning Commission, 2002). An average female in the rural areas of the Himalaya Mountain generally bring 15 litres of water at one time and on an average it nearly takes 45 minutes to fetch water from the nearly source, but the actual process sometimes takes as long as 5 hours. Apart from direct financial gains, easier access to safe water reduces demands on women's time and opens up income generating opportunities (Rautela, 2000). If water source were to be available at household plot (less than 100 metres) it would not only raise water quantity but also eliminate the need for women and girls to collect water. Water collection is a part of gender division of labour that reinforces inequality within households, contributes to time poverty and retards the human development prospects for a large section of the world's people (Human Development Report, 2006).

Mountains are considered the *water towers* of the world but they suffer from problem of water. Despite plenty of rainfall many villages and towns like Dehradun, Almora, Pithoragarh, Pauri, Chamba, Mussoorie, Lansdowne, in the Uttarakhand region face acute shortage of drinking water (Rautela, 2000). Working on the problem of water resources in the Hindu Kush Himalaya region, Banskota et al. (2000) found that the degradation of watershed has drastically reduced the supply of fresh water. Deforestation, over cultivation and over grazing are the main factors which have seriously affected the availability of fresh water in the mountainous areas. The hill town of Shillong faces scarcity of water during the lean period due to lack of proper storage of rainfall, removal of forest cover, steep topography and increasing population (Husain, 1999).

Cherrapunjee is a hill town located in the southern part of Meghalaya. Inspite of recieving the highest amount of rainfall in the world the the people in the region have been paradoxically facing an acute problem of water scarcity for drinking and domestic uses (Dohling, 2003). The problem is so severe that people have to resort to buying water to meet their needs. Over the years rainfall has declined and this will further exacerabate the problem.

A lot of work regarding the geomorphic (Biswas, 1990; Dohling, 2003) and hydrological characteristics, i.e., runoff, rainfall-runoff relationship (Prokop, 1999; Singh, 2002) of Cherrapunjee have been

done over the years. The issue of water scarcity in the area has been often highlighted at various occassions but no definitive work has been done on it. This paper attempts to fill this gap and shed light on the problems faced by the people due to water scarcity.

Study Area

Physical setup

The Cherrapunjee town is located at 25^0 17' 56'' North latitude and 91^0 42' 41'' East longitudes with an elevation of 1300 metres above mean sea level. The Cherrapunjee town is a part of the Cherrapunjee plateau which has a highly dissected terrain along the southern part of the Meghalaya Plateau. The plateau has an elevation ranging from 1200 m to 1530 m.

The Cherrapunjee plateau is a part of the Shillong plateau and likewise consists of very ancient Archean and Shillong series of rocks. The extreme north and south-western part of the Cherra block consists of Archean Gneissic complex having gneisses, migamatite and met-sedimentary bands while the Shillong group of rocks predominantly composed of quartzite, schists, conglomerate etc. are found in the extreme north-eastern parts. Towards the south, Cretaceous Tertiary sediments are found which consist of sandstone, slate and fossileferous limestone. Along the southern margin of the Cherrapunjee plateau, the traps rocks known as the Sylhet Trap are found exposed in a narrow east-west strip.

To the north of the Cherrapunjee Plateau lies the Shillong Plateau, to the south the Bangladesh plains and to the west lies the Mawsynram plateau. On the western side, it gradually slopes down to the valley of river Umiew, in the eastern part it gradually slopes down to the river Umngi and in the north it gradually ascends gently towards the Central higher plateau. Its southern part is marked with a lowering of the plateau surface to 1000 m which further lowers to a height of 50 m near the Bangladesh plain. The landforms in the area can be broadly classified into the Plateau section comprising of gently sloping plateau, plateau relicts, gorges, stream valleys and cuesta and the Denudational Hills that have moderately sloping hills, steeply sloping hills, elongated valley, underground channels, gorges and recent terraces (Biswas, 1990; Dohling, 2003).

Cherrapunjee experiences cold temperate climate with foggy winter months while the southern part of the terrain along the Bangladesh border experiences hot summer with cool winter (Biswas, 1990). The most significant factor controlling the climate in Cherrapunjee is the South-West Monsoon and altitude (Dohling, 2003) with the South-West Monsoon determining the amount of rainfall and altitude determining the temperature conditions.

More than 2/ 3rd of the rainfall, i.e., annual average of 1100 cm, is received during the summer rainy season/ the monsoon season (June to mid-September). The other seasons in the area are the Pre-monsoon (March to May) which receives more than 20% of the total rainfall, and the Post- monsoon season (September to November) which gets less than 10% of the total rainfall. Cherrapunjee directly faces the moisture laden atmospheric circulation, i.e., the South-West Monsoon winds funnelled from the Bay of Bengal through the Bangladesh plains. The South-West Monsoon winds blowing to the north are cut off by the cliffs of the Cherrapunjee plateau with an average elevation of 1200 m which protrudes like a peninsula into the surrounding gorges about 600 m deep on either side and as a result the monsoon having reached the heads of the gorges ascends vertically upwards and causes very heavy rainfall (Khullar, 1999; Singh, 2004). Most of the rainfall in Cherrapunjee is due to this orographic effect although some of it during the pre and post- monsoon season is due to cyclonic depressions. Taking a 35 year period (1973-2007), the average annual rainfall in Cherrapunjee was found to be around 1195.2 cm. When we take a 17 year period (1991-2007) the annual rainfall was around 1171.2 cm which means rainfall has decreased over the years, e.g., the years 2005 and 2006, in fact received less than 1000 cm of rainfall.

Temperature varies from minimum of 5^0 C to a maximum of 26^0 C. The heavy rainfall helps in bringing down the temperature and the average temperature throughout the year is just over 17^0 C. January is the coldest month with temperature just above 10^0 C, although the minimum temperature may drop below than 10^0 C. June is the hottest month with maximum temperature approaching 25^0 C. As per the Koppen scheme of climatic classification, Cherrapunjee would be under C*wg* climate type and AA'*r* under Thornthwaite's classification.

Socio-economic Profile

The town of Cherrapunjee has evolved from a market place to now become an important tourist destination. When the British came to the Khasi Hills they were looking for a suitable place to build a sanatorium and a cantonment for the British military. At first the British selected Cherrapunjee but due to inclement weather and lack of water supplies Shillong was opted as a better choice in 1829. However, the actual transfer was completed on in 1863. The local name of Cherrapunjee is '*Sohra*' which got corrupted into Cherra and then Cherrapunjee.

Cherrapunjee is the headquarter of the Shella Bholaganj Sub-division and is the only urban centre in the whole area. It is also the seat of the *Syiem* of Sohra who is the traditional ruler of the area, comprising of the town of Cherra and a number of villages in the Shella Bholaganj Sub-division and some villages in the Mawsynram Sub-division, known as the *Sohra Syiemship*.

Cherrapunjee town has a total population of 10, 086 persons staying in 1,805 households (Census, 2001). The main population group to be found in the area is the Khasis. The Khasis belong to the Mongoloid racial group and are believed to be one of the first groups to have arrived in the North-East. They speak the Mon-Khmer language which belongs to the Austro-Asiatic group of language family. In fact, in India there are only three groups of community-the Mundas, the Khasis and the Nicobaris who speak the Austric languages. Other communities like the Bengali, Assamese are also found and they make around 4% of the total population (Census, 2001). The land around Cherrapunjee is not very good for agriculture. Hence, the people of Cherrapunjee and the surrounding villages are engaged in the mining of coal, limestone and sand. In the 1960's the Government of Meghalaya established the Mawmluh-Cherra Cements ltd. This factory has greatly helped in providing employment to the local people.

Methodology

The town of Cherrapunjee consists of eleven localities, viz., Mawmluh, Mawsmai Saitsohpen, Pdengshnong, Maraikaphon, Khliehshnong, Nongrim, Pomsohmen, Nongsawlia, Mawkisyiem and Kutmadan out

of which the first three have been omitted from this study. A housheold survey of 104 households was done in order to collect data on the status of domestic water in the selected localities. For the collection of household data a structured schedule was prepared which consists of questions regarding the different sources of domestic water in the area, accessibility of the households to them, amount collected and coping strategy in periods of water shortage. The data were then processed using the statistical techniques of mean and standard deviation to find out the amount of water that households can collect for domestic consumption from different sources and compare with the required standard. Tables and graphs are used to illustrate the results.

Data Analysis, Result and Findings

Sources of domestic water

Sources of domestic water during the rainy season: The different sources from which the households collect water for domestic consumption are streams, ponds, common point (C. P.), springs, rain water, home connection and other sources like collecting from relatives etc. (Table 1). The common point is managed by the PHE while the others sources are under community ownership. Home connection can be either by the PHE or private self.

Table 25.1: Amount of domestic water collected per household from the different sources during the rainy season

Seasons	Localities	Sources (litres/ household)							
		Home connection	Streams	Pond	Public Taps	Springs	Rain water	Others	Total
Rainy	Pdengshnong	350	00	45	73	85	352	200	496
	Khliehshnong	307	00	84	126	40	323	400	525
	Maraikophan	00	00	60	99	76	261	00	397
	Nongrim	311	00	00	62	57	355	00	465
	Nohsawlia	71	00	00	128	59	281	00	448
	Mawkasyiem	438	00	270	142	70	249	00	431
	Pomsohmen	00	85	97	86	75	192	250	297
	Kutmadan	00	00	67	66	72	158	00	363

Source: Field Investigation, 2009

During the rainy season most of the households collect water and store it for domestic consumption. Rainwater during this period is a very important source and most households collect more than 250 litres/ day of rainwater. It was only in Pomsohmen and Kutmadan that the rain water collection was found to be lower than 200 litres/ day. This is because the households in these localities are very poor and do not have enough utensils to store water. Rainwater is used for all the domestic activities, viz. drinking, cooking, taking bath, washing utensils, clothes, toilet, cleaning the house, watering the garden etc. However, the rainfall during the first month is of bad quality and it is only after it has rained for more than a month that people can collect the rain water for use. There is a huge amount of pollution of the air in Cherrapunjee through smoke and dust from the Mawmluh Cherra Cement Limited (MCCL) factory. When the first rain falls they get mixed with these pollutants and degrade the quality of water. It is only after a sufficient time that rainfall is able to wash these pollutants and clean rain water is available. Most of the households would boil the rain water before they use it for drinking and cooking. However, some households would take it without any treatment. For drinking and cooking purpose spring water is preferred by most of the households. The water from the common point i.e. common standpipe of the PHE is of bad quality and most of the households do not use it for cooking and drinking. The source of PHE water is from the Laityrngew-Mawkma area where intensive coal mining is going on. This has led to the pollution of the water bodies. During this season the water from the common points is red in colour. Pond water is used for cooking and drinking apart from the other domestic activities. Pond water is very important in Mawkasyiem where a digging of few feet yields good source of water. However it is only those households who have a house of their own that can obtain pond water. Households that have home connection can collect a good amount of water (average of 300 litres/ day) for domestic activities. However, not all the households even in Pdengshnong, Khliehshnong, Nohsawlia, Nongrim and Mawkasyiem, where home connections were recorded, have home connections. Households that have their own house or can afford to build infrastructure or make payment for obtaining water do not have much

problems but households of poor financial capability who stay on rent face hardships for collecting water. From all the sources the households are able to collect around 430 litres/ day during the rainy season.

Sources of domestic water during the dry season: The dry season is a period of great water shortage in the area. During this season, the amount of rainfall has greatly declined and the area does not get more than 10 cm of monthly rainfall. Climatically this is a water scarce period which again is reflected in the amount of water collection that the households can achieve during this period.

Table 25.2: Amount of domestic water collected per household from the different sources during the dry season

Seasons		Sources (litres/ household)							
		Home connection	Streams	Pond	Public Taps	Springs	Rain water	Others	Total
Rainy	Pdengshnong	200	00	60	179	205	00	00	333
	Khliehshnong	307	00	149	203	65	00	400	321
	Maraikophan	00	00	00	83	155	00	00	231
	Nongrim	311	00	00	160	114	00	00	293
	Nohsawlia	71	00	00	214	131	00	00	345
	Mawkasyiem	296	300	210	154	53	00	60	311
	Pomsohmen	00	90	97	122	112	00	250	185
	Kutmadan	00	00	158	67	88	00	00	167

Source: Field Investigation, 2009

Rainwater is no more available during the dry season and other sources like springs, common points, ponds, streams, home connection and others become important. Households that have house connection can still collect more than 200 litres/ day of water for domestic activities. Most of the households depend on springs and common points during this season and the amount of water collected from these sources is more than what they collect during the rainy season. This means greater time and effort have to be spent in collecting water from these sources for use in the different domestic activities. During this season households also depend on ponds and streams for obtaining the required amount. For drinking and cooking spring

and pond water is still preferred while water from the common points is still mainly meant for other domestic activities other than the aforementioned. The flow of water in the common points gets reduced during the dry season and the pipes also get regularly spoilt. Sometimes there would be no flow for around a month and people have to face great hardship in collecting water from other sources. The households would spend an average of 8 hours in a day for collecting water from different sources. This includes the time taken for going to and coming back from the source and waiting for collection. Some households would go at night for water collection so as to avoid the crowd. Quarrels often break up during water collection. During this season households are able to collect about 286 litres/ day which is just 2/ 3rd of the amount they collect during the rainy season. Since water is lesser many of the activities are transferred from the homes to the sources, i.e. activities like taking bath, washing clothes and utensils are being done at the springs, streams to avoid collection of water. However, because there is greater pressure on these sources during the dry season they get polluted. Some households in Nongrim have reported of hiring vehicles to carry their clothes to wash in streams over 3 kms away. Again in Nongrim, some households make payment to certain persons to collect and bring water to their homes.

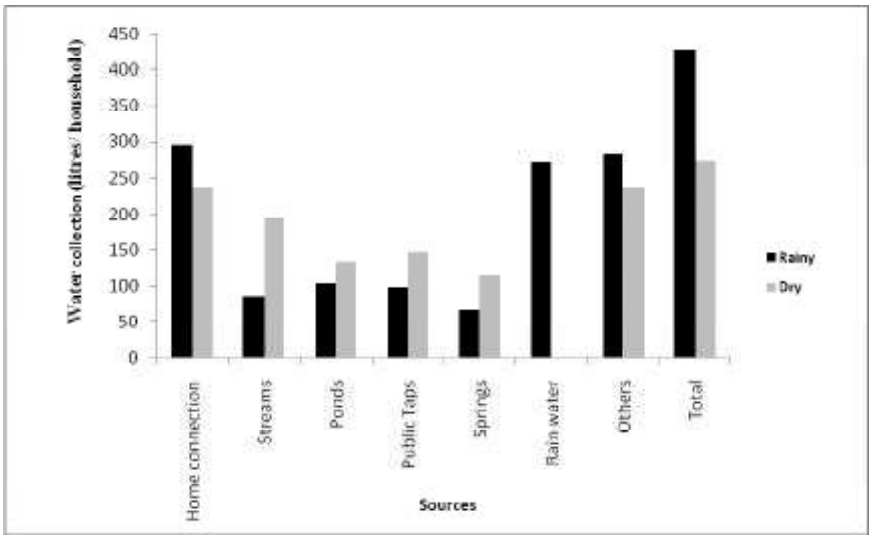

Fig. 25.1: Collection of domestic water per household Per Capita Availability of Water

The PHE department which is responsible for supplying domestic water to the Cherrapunjee town is supplying about 6 lakh litres of water every day. Their objective is to supply 70 lpcd (litres per capita per day) of water for domestic consumption. According to the 2001 census the population of Cherrapunjee town is 10086 persons. Even by this figure the PHE is supplying about one lakh litres less than what is required. Over the years the population of Cherrapunjee has increased and the present supply is highly inadequate. In addition to that there is a problem of lack of maintenance of pipelines which has led to loss of significant amount of water due to leakages. Supply is highly irregular and inadequate especially during the dry seasons when reliable supply of water is needed due to the absence of rainwater and reduced flow in the springs, streams etc.

Table 25.3: Seasonal per capita availability of water for domestic consumption

Sl. No.	Localities	Season	
		Rainy (lpcd)	Dry (lpcd)
1.	Pdengshnong	93	64
2.	Khliehshnong	84	55
3.	Maraikophan	72	45
4.	Nongrim	87	56
5.	Nohsawlia	88	63
6.	Mawkasyiem	90	59
7.	Pomsohmen	65	43
8.	Kutmadan	52	35

Source: Household Survey, 2009

From the different sources, the households are able to collect around 78 lpcd during the rainy season and 52 lpcd during the dry season. During the rainy season it is mainly rain water which provides the major source of domestic water. Pomsohmen and Kutmadan however, get less than 70 lpcd even during the rainy season. The main reasons are the lack of proper management and maintenance of the water supply infrastructure by the PHE which leads to losses due to leakages and no flow for many days and the poor economic condition of the people making them unable to afford home connection, construct infrastructure of their own to obtain water and collect rainwater due to lack of utensils to store water.

During the dry season, all the localities face water shortage and the water availability is below the required norm i.e. 70 lpcd. Kutmadan and Pomsohmen get less than 50 lpcd during this season which indicates very severe shortage. Only Pdengshnong and Nohsawlia are able to collect more than 60 lpcd during the dry season. Rainwater which was a very important source in the rainy season is no longer available. The flow in the common point and springs is also greatly reduced and as a result households are not able to collect the required amount.

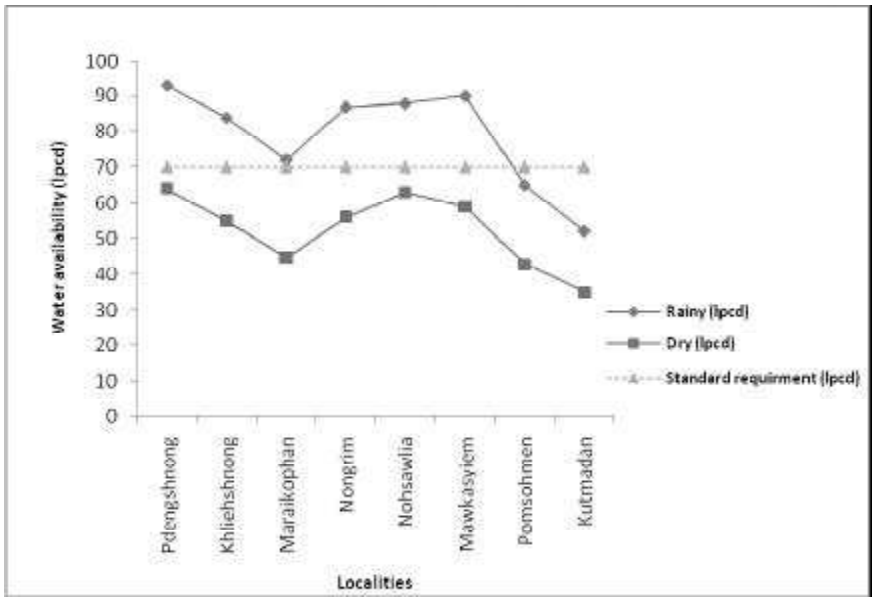

Fig. 25.2: Seasonal per capita availability of water for domestic consumption

There are many factors which influence the amount of water that can be collected from the different sources for domestic activities. They are the status of water supply infrastructure, health of the sources during the different seasons, distance of the sources from homes, economic status of the households etc. However, of all factors the size of the household has been found to be the most important factor in determining the amount of water that can be collected by the households for domestic activities. The average household size is five persons/ household. For the purpose of analyzing the influence

of household size on amount of water collection, households having five of less members have been identified as small households and households having more than five members have been identified as large households. It was found that large households i.e. more than five members have to put in more hours for water collection than the small households i.e. five or less members but still can collect lesser than the latter. The households spend an average of 8 hours/ day for water collection. The average water collection time of the large households is 9 hours/ day while that of the small households is 7 hours/ day. Even though they spend more time for water collection, the large households are able to collect lesser water than the small households (see table 25.4.).

Table 25.4: Seasonal collection of water among different households

Sl. No.	Localities	5 or less members		More than 5 members	
		Rainy (lpcd)	Dry (lpcd)	Rainy (lpcd)	Dry (lpcd)
1.	Pdengshnong	123	94	73	46
2.	Khliehshnong	109	81	69	38
3.	Maraikophan	78	52	63	35
4.	Nongrim	92	60	79	49
5.	Nohsawlia	112	71	69	56
6.	Mawkasyiem	90	60	89	57
7.	Pomsohmen	72	52	51	27
8.	Kutmadan	53	30	52	37

Source: Household Survey, 2009

More than one third of the time (8 hours) during the whole day is spent in collecting water. Apart from the loss of time, a lot of effort is also involved which makes the person who collects the water very tired. It becomes more difficult during the dry season when the nearby sources are not adequate and people have to go farther to collect water. There is no gender division for water collection and both the sexes and of all age groups (except the very small and very old) go to the sources for collecting water. When children are especially involved it disrupts their studies and leisure time.

In times of water shortage the households would reduce their water consumption by performing those activities which have been

perceived as being wasting the most water, washing clothes, utensils and taking bath, at the sources i.e. spring, stream and ponds. Water from the common point is greatly reduced during this time. A few households in Pomsohmen, Maraikophan and Nongrim have reported of buying water during the lean season. However, they are very few and not enough cases were recorded of water buying to make it an important water shortage coping strategy. Most of the households are not aware of water harvesting and conservation measures and consider the problem of water shortage to be the responsibility of the village authority and the concerned government departments.

Conclusion

For an ubran area of up to 10, 000 population, 70 – 100 lpcd may be adequate for its domestic needs. According to the 2001 Census Cherrapunjee town had a population of 10086 persons and PHE department wants to supply 70 lpcd of water for domestic consumption. However, as already mentioned it is supplying less than what is required and the supply is also highly irregular and unreliable. During the rainy season it is mainly because of the rain water that people are able to collect the required amount of water for domestic consumption. Springs, streams, ponds become very important during the dry season when rain water is no longer available and common point, unreliable and inadequate. Even after spending many hours for water collection the households are not able to collect the required amount i.e. 70 lpcd. Seasonal distribution of rainfall is a very important factor regarding the amount of water that is available for domestic consumption to the households but other socio-economic factors like status of water supply infrastructure, health of the sources during the different seasons, distance of the sources from homes, economic status of the households etc. also influence the amount of water that can be collected. Of great importance is the size of the households which was found to be the most important factor determining the amount of water collection for domestic purpose. The level of awareness of the people regarding water harvesting and conservation was found to be very low and in order to improve the status of domestic water in the area, this has to be first remedied. Proper management and maintenance of the water

supply infrastructure, storage of rain water to be used during the dry season, environmental protection and management to improve the health of the sources are some of the steps that should be taken to tackle the problem of water shortage in the rainiest place on the earth.

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