Dutta-19-20
Art

One Day Interdisciplinary

NATIONAL SEMINAR

on

"TRENDS IN GEOGRAPHY, COMMERCE, IT AND SUSTAINABLE DEVELOPMENT"

29th Feb. 2020.

Organized by

Department of Geography

Sahajeevan Shikshan Sanstha

ICS College, Khed (Dist. Ratnagiri)

MAHARASHTRA- 415 709

(NAAC Re-Accredited with B++ 2.83 Grade)

&

The Bombay Geographical Association

C/O Dept. of Geography, University of Mumbai

Principal	Certified as TRUE COPY	Convener
Dr. G.B. Sarang	Principal Ramniranjan Jhunjhunwala College, Ghatkopar (W), Mumbai-400086.	Dr. Anita Awati
Editor		Chief Editor
Dr. Chandrashekhar Salunkhe		Mr. Pramod P.Tandale

Our Inspiration

Hon'bl. Hiranchand P. Butala President, Sahjeevan Shikshan Sanstha	
Hon'bl. Mangeshbhai Butala Secretary, Sahjeevan Shikshan Sanstha Hon'bl. Adv. Anandrao Bhosale Chairman, College Governing Council	Hon'bl. Nandkumar Gujrathi Vice-President Sahjeevan Shikshan Sanstha Hon'bl. Anant Patne Vice-Chairman, College Governing Council

Advisory Committee

Dr. Ajay Bhamre, Dean Commerce & Management ,Univ. of Mumbai Dr. S.A.Thakur, Chairman, BOS Geography	Dr. B.C. Vaidya, JNU . New Delhi Dr.Sanjuctta Sattar Head, Dept of Geography, Univ. of Mumbai
Mrs. Bharati Unni Secretary, BGA	
Dr. Atul Salunkhe, Principal Dr. Deepak Raverkar, Principal Dr Hemant Pednekar, Principal Dr. Sachin Deore, HOD, SNDT University Dr. Sudhir Puranik, Dr. B.S. Bidve	Dr. Prasad Bhanage Director, MSIBM Dr. Rajendra Patil, BOS Member IT Dr. Surendra Thakurdesai Dr. D. G. Shinde Dr. Sudhir Ingale Dr. R.G.Patil Retd. Head, SNDT

Organising Committee

Dr. D.D. Agam, Co-Convener & Organising Secretary	
• Dr. Suresh Nale • Mr. Sachin Bhosale • Mrs. Sajeli Butala	• Dr. C. R. Salunkhe • Mr. Kelkar M.K. • Mr. Amit Jadhav

©The Principal, ICS College, Khed (Dist. Ratnagiri)

All rights reserved. No part of this publication can be reproduced, stored or transmitted in any form or by any Means, Electronic as Mechanical, including Photocopy, Micro-filming and recording or by any information Storage and retrieval System without the Proper Permission in writing of copyright owners. The opinions expressed in the articles by the Authors and contributors are their own and the Chief Editor assumes no responsibility for the same.

Disclaimer

Research papers published in this Special Issue are the intellectual contribution done by the authors. Authors are solely responsible for their published work in this special Issue and the Editor of this special Issue are not responsible in any form.

ISSN : 2349-638x

Special Issue No.77 Published by:

Aayushi International Interdisciplinary Research Journal (AIIRJ)

Peer Review and Indexed Journal — Impact Factor 6.293

Website : www.aiirjournal.com — Chief Editor – Pramod P. Tandale

Certified as
TRUE COPY

Principal
Ramniranjan Jhunjhunwala College,
Ghatkopar (W), Mumbai-400086.

PRINCIPAL
RAMNIRANJAN JHUNJHUNWALA COLLEGE
OF ARTS, SCIENCE & COMMERCE (AUTONOMOUS)
Ghatkopar (W), Mumbai-400 086, Maharashtra, INDIA

Water Scarcity in Mumbai: Need For an Efficient Solution

Dr Baishakhi Dutta,
Associate Professor

1) Introduction:-

Water use has grown at more than twice the rate of the human population over the last century which account for70 per cent of global freshwater use. India has 4 % of the world's freshwater which has to cater to 17 % of the world's population. As per NITI Aayog Report released in June 2019, India is facing the worst-ever water crisis in history. Approximately 600 million people or roughly around 45 % of the population in India is facing high to severe water stress. As per the report, 21 Indian cities will run out of their main source of water i.e. groundwater by 2020. The report also says that nearly 40 % of the population will have absolutely no access to drinking water by 2030 and 6 % of India's GDP will be lost by 2050 due to the water crisis.

World Water Day is held annually on March 22 to focus attention on the importance of fresh water and advocate sustainable management of this precious resource. Each year this day highlights a special aspect of freshwater.The theme of 2019 was about tackling the water crisis by addressing the marginalized groups – women, children, refugees, indigenous peoples, and disabled people for safe access to water. Human population is growing continuously, which means there is less water for everyone to satisfy the need for a healthy life. Agriculture accounts for 70% of freshwater withdrawal and the rest for industrial, domestic, energy, fisheries and environment related consumptions. The last 50 years have witnessed a rapid acceleration in water resource development. Coping with population growth and ensuring access for all related to water requirements poses an all-time challenge to India and the world.

Life does not exist without water and it is essential not only for the existence of the living flora & fauna but also human life. It is also essential for our happiness, peace and prosperity. Today water scarcity is emerging as a major issue confronting the world. This could soon be true in India as most of the cities face a water crisis. Rapid urban and industrial growth together with unprecedented demands for water is taking a toll on our economy. Mumbai ranks among the top 20 global cities in terms of municipal water demand in the next one decade followed by Delhi. The other Indian cities are Kolkata, Pune, Indore, Hyderabad and others [McKinsey Global Institute Report, 2017]. Since the last 2 years the problem of water crisis and water shortage has increased manifold. All of us are responsible for this crisis and all of us have a duty to overcome the problem.

Water scarcity indicates insufficient freshwater resources to meet the human and environmental demands of a given area. Adequate access to safe drinking water is a priority for global development. However, given the challenges of population growth, unfiltered use, changes in weather patterns due to global warming, many countries, both wealthy and poor are facing water scarcity in the 21st century.

2. The research questions which arises here is that:–

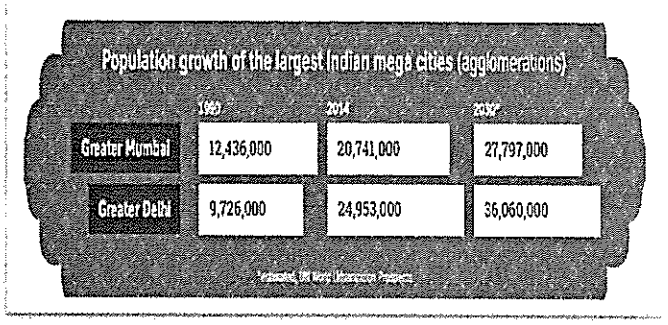
1. What is the real problem of water crisis in a megacity like Mumbai
2. What can be the causes to the problem?
3. Can we think of some effective and efficient solutions to the water crisis?

3. About The Study Area

Mumbai (previously known as Bombay) is the capital city of Maharashtra located on the West coast of India.Mumbai is also a leading commercial, financial and industrial Megacity. It has the highest GDP (Gross Domestic Product) in the South, West and Central Asian regions.The greater Mumbai metropolitan area – comprising of "Mumbai suburban district" as well as the cities of Navi Mumbai, Thane, Bhiwandi, and Kalyan – will soon be a home for 27.7 million people by 2030.(UN World Urbanization Prospects).

PRINCIPAL
RAMNIRANJAN JHUNJHUNWALA COLLEGE OF ARTS, SCIENCE & COMMERCE

Table 1



Megacity Mumbai is a major contributor to State and National economy which accounts for slightly more than 6.16% of India's economy contributing 10% of factory employment, 30% of income tax collections, 60% of customs duty collections, 20% of central excise tax collections, 40% of foreign trade and rupees 40,000 crores (US$10 billion) in corporate taxes to the Indian economy. (TOI, February 2017). People of Mumbai deserve a better level of basic public services which is a major challenge for city planners today. It is predicted by environmentalists that Mumbai is likely to see a serious water shortage with poor monsoon rains rapidly bringing down water levels in the six lakes that feed the city.

4.Water Supply Of Mumbai:-

Mumbai's water supply is totally handled by Municipal Corporation of Greater Mumbai whose mission statement is to provide all users in the city with continuous, uninterrupted, reliable, good quality clean water which is cost effective. The primary sources of water for cities like Mumbai are lakes created by dams across rivers near the city.Mumbai's water supply comes from seven lakes – Tansa, ModakSagar, Bhatsa, Vaitarna, Tulsi, Vihar and Powai. The monsoon precipitation is collected in these lakes and supplied to the city throughout the year. The system is made up of reservoirs, storage tanks, pipes and taps. Map 1 indicates the sources of the lakes which provide water to the megacity Mumbai. Table 2 indicates the year of completion of the dams and quantity of water supply along with the cumulative supply by all the schemes together.

Map 1

Sources of Water Supply For Mumbai

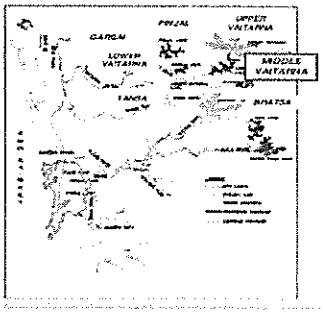


Table 2

Existing Water Supply Sources

Sr. No.	Name of the Source	Year of Completion	Qty of Water Supply (MLD)	Total Qty of Water Supply (MLD) Cumulative)
1	Vihar Lake	1860	110	110
2	Tulsi Lake	1879	18	128
3	Tansa Lake	1892 to 1925	485	613
4	Modak sagar & Upper Vaitarna	1957	1142	1755
5	Bhatsa (3 SCHEMES TOGETHER)	1974 to 2007	1700	3455
	Middle Vaitrna	2014	455	3910

Source: MCGM

Certified as TRUE COPY
Principal
Ramniranjan Jhunjhunwala College,
Ghatkopar (W), Mumbai-400086.

Presently MCGM [Municipal Corporation of Greater Mumbai] supplies 3470 MLD of water from the seven main water sources, out of which 120 MLD is supplied to Thane and its neighboring rural areas. The water distribution in Mumbai is very old. Water is supplied to the city after lake water is treated and stored in 23 service reservoirs. The service reservoirs are mainly situated on hills like Malabar Hill, Worli Hill, Raoli, Pali Hill, Malad, Powai and Bhandup. 80% of the water connection owned by BMC is metered. Currently BMC earns about Rs 4.5 billion or 450 crores annually. (Department of Water Data, MCGM) The total water demand for the city of Mumbai is 4250 MLD and the total water drawn by MCGM is 3470 MLD leading to a demand – supply gap of 780 MLD. Demand for the mega city is expected to rise to 5400 MLD in 2021 [Chitale Commission Report, 2006] which may worsen the situation and make it an emerging issue with the increasing population.

4.Water Woes And Challenges:-

Mumbai gets its water supply from conventional sources of water example lakes, dams, reservoirs, etc. However with the growing administrative limits of the megacity and increasing population, these sources of water are being proved inadequate creating a crisis – like situation. Recommendations of Chitale Committee, March 2006, is being looked into seriously as the two dams,Gargai-Pinjaland Daman dam are going to take care of the water supply requirements of the megacity Mumbai in next five to seven years.However the question arises that how much could one depend on rainwater, when monsoons are getting delayed every year? Many areas of Mumbai receive only 30 minutes of water supply every day, like Malabar Hills, Cuffe Parade, Bandra, Versova, Mahim, Andheri, Kandivali and so on.

Mumbai's requirement of water resources has been well thought and planned and the water supply systems have been well designed to meet the increasing demands of the growing population. This deficit like situation in Mumbai, there is due to lack of proper management of water resources,

Situation Analysis:-

The following features are being reflected in the status of water resources in Mumbai:

- Out of the gross available water supply of 3,740 MLD, the losses through leakages and other sources make the net available water supply to 2,320 MLD, which also includes 600 MLD water supply for non-domestic purposes i.e., industry and commerce. There is a shortfall of about 900 MLD between the water supply and demand in Mumbai.
- The losses arising from leakage through water supply distribution system amount to almost 25% and above (with the inclusion of theft and pilferage, it may even rise up to 30%), which is very high in spite of the MCGM attempts to reduce it to 15%.
- The entire range of functions of water supply and sewerage are concentrated with the single entity MCGM, which is responsible for wide range of functions. Concentration of all services in the hands of one large organization has led to inefficiency in the service delivery and promoted corruption at various levels.
- The spatial, temporal and sectoral coverage of water is still missing i.e., some parts of the city do not receive water; some of them receive it intermittently; and some sectors have more privilege in accessing it more than others. Moreover, water supply is not quite reliable option to some areas which are off from the main trunk line of the distribution system.
- Even though water has the characteristics of public good MCGM should identify the threshold point of necessity and levy higher water tariff for greater amount of unit water consumption.
- Some areas are facing low pressure water supply as they are located at an elevation and few at the end of the pipelines.
- Corporators also agree that the worst affected areas are Kurla, Mankhurd, Chembur, Mohammed Ali Road, etc. [Observer Research Foundation, Mumbai].
- Pipelines network are old in the city thereby repair and replacement becomes difficult. There is acute shortage of experienced staffs in MCGM making the scenario gruesome.
- The Hindustan Times undertook a survey on the problems faced by Mumbaikars. Almost 75% of people are concerned with water shortages. 40% of residents say that their water supply situation has deteriorated and only 13% residents think optimistically that this condition will improve.

5. In Search Of Efficient Solutions :-

MCGM has initiated some bold steps to improve water supply system in the city by strengthening the supply –demand management. Some suggested solutions taken up can make the situation better. They are as follows –

PRINCIPAL
RAMNIRANJAN JHUNJHUNWALA COLLEGE OF ARTS, SCIENCE & COMMERCE (AUTONOMOUS) Ghatkopar (W), Mumbai-400 086, Maharashtra (INDIA)

a) **Invent new water conservation technologies-** In areas where aquifers are drying up and rainwater is increasingly unpredictable, innovation is needed. There is a need to explore multiple options and not completely depend on rainwater when monsoons are delayed. For this, recycling is one of the options that were thought over. Desalination is another option as Mumbai has a vast sea water reserves. Cost is an important issue but if technology is available, desalination plants can gradually procure water, decreasing the cost in the long run. Public- Private Partnership can make such initiatives which in the long run turn out to be a very fruitful association managing water in big cities.

b) **Recycle Waste Water-** World Water Day celebrated in March panelists, are trying to recycle water to become more self-sufficient. The scientists are trying to develop advanced technology that cleanses wastewater for other uses. In Mumbai big builders have joined hands e.g. Hiranandani, Lodha. Godrej etc. and have taken initiatives to recycle waste water for their esteemed project as a CSR initiative.

c) **Rain Water Harvesting :**Another solution which is being emphasized by the government is rainwater harvesting. Lots of co-operative societies in Mumbai are implementing this method to save water. In this process extra water during rainfall (monsoon season) is collected in underground tanks and preserved. This can be used for gardening, washing, toilets etc. during parched seasons. Rainwater harvesting requires little space and less cost. It needs a rooftop or ground pipelines, a row of soak pits or a tank concealed below the ground. Rooftops or grounds can be used as the catchment area. Sealine Housing Society in Khar, Mumbai has no shortage of water, despite varied rainfall as they have installed a rainwater harvesting system in their buildings. It took 6 lakhs rupees forsetting up Rainwater Harvesting, but the residents saw it not as a cost but an investment for the future. In these times of scarcity, Sealine Society, Khar could set an example for other societies.In the corporate world, Asian Paints, India's largest paint company has taken a huge stride to promote water conservation by setting up a Total Water Management (TWM) Centre at Bhandup. It showcases live working models on rainwater harvesting and water conservation. It provides free expertise to citizens free of cost to implement such concepts.

d) **Appropriately price water**: Water pricing go hand in hand, with consumers behavior and use of the precious resource.
Water tax is so low in Mumbai that common man do not acknowledge the importance of it. If the water tax is raised people will automatically change their behavior and will not waste water or add to pollution.

e) **Stop Leakages Immediately**-Some immediate steps should be taken up which includes plugging of leaks in our existing water supply lines, zone wise water cut once a week, 30% water cut for commercial consumers, no new connections to high rise buildings, penalizing water wastage, etc. can also bring in a sea – change in the scenario of water crisis.

f) **Social Networking**-The Brihanmumbai Municipal Corporation (BMC) will have its profile on social networking sites like Orkut and Facebook and post information on issues like water conservation methods and causes of water problems in Mumbai. The BMC is the first municipal corporation in the country to join the online networking community. The profiles will have information on water harvesting, desalination, conservation and success stories.

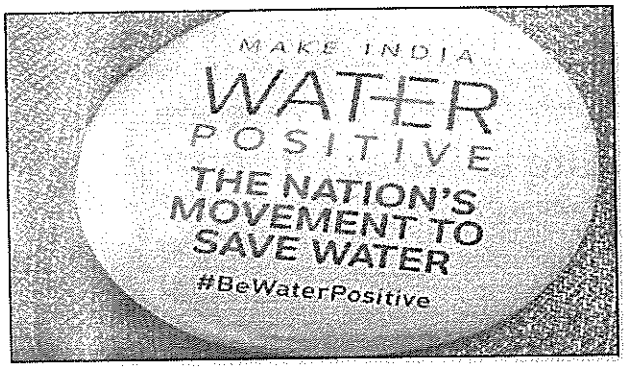
g) **Sensitization Programmes**-Mass educational campaigns should be taken up by the government and NGOs to encourage every citizen for some behavioral change towards saving water. Campaigns should sensitize and provide incentives for water conservation. Politicians, residential groups, schools, industries, hotels, hospitals and big institutions like TIFR; TISS & B.A.R.C should actively participate in checking water deficit.

6) Conclusion:-

To conclude,there should be a long term sustainable solution. Administrative efficiency should be beefed up, backed by strong political will and citizen's support. There should be appropriate emphasis on raising water literacy and promoting proper management of water resources. It is well said that water must have a price. Anything that is for free won't be used prudently. Therefore every resident's mission should be to save water to save Mumbai.Students volunteering with the civic body can be considered a project work for them.The need for demand managementhas also been implied through the need for changes in pricing strategy and technological solutions for water conservation. However, more than that there is an immediate need for undertaking various institutional and sectoral reforms for improving the water resources management, which will lead to enhanced water supply services both quality and quantity.In fact, in order to cope with future water scarcity, it is necessary to radically reform all forms of consumption, from individual use to the supply chains of large companies.

PRINCIPAL
RAMNIRANJAN JHUNJHUNWALA COLL
OF ARTS, SCIENCE & COMMERCE (AUTONOM
Ghatkopar (W), Mumbai-400086, Maharashtra

SOURCE: TOI'S INITIATIVE TO BRING CHANGE. (19th February 2020)



Selected References:-

1. Christin. Ann ; Water Business: Corporations Versus People, Book for change, Bangalore, 2005.
2. Rogers, P and AW. Hall ; Effective Water Governance, Elanders Norum, Sweden, 2003.
3. Sivaramkrishnan, K.C, Amitabh Kundu & B.N Singh; Handbook of Urbanization in India; an Analysis of Trend and Processes, Oxford University Press, New Delhi, 2005.
4. Ghosh.,Ashish; Natural Resource Conservation and Environment Management, APH Publishing, New Delhi, 2003.
5. Iyer, Rangaswamy & R, Water: Perspective, Issues and Concerns, Sage Publications, New Delhi, 2003.
6. Prakash, Gyan; 'The Urban Turn', in the Cities of Everyday Life, Sarai Reader, New Delhi, 2002
7. Agarwal, Anil and Sunita Narain (Ed); Dying Wisdom: Rise, fall and Potential of India's Traditional Water Harvesting Systems, CSE, New Delhi, 1997.
8. Diddee Jayamala and Vimala Rangaswamy (Ed); Urbanisation : Trends, Perspectives and Challenges, Rawat Publications, Jaipur, 1993.
9. Singh, Chhatrapati ; Water Law in India, The Indian Law Institute, Bombay, 1992
10. Chitale Committee Report: March 2006.
11. MC Kinsey Global Institute Report 2010.
12. JP Morgan, Chase Greg, Clark and Others; Mumbai: India's global city: A case study for the Global Cities Initiative December 2014.
13. Ramakrishna Nallathiga,; Mumbai s water resources: The need for reforms in their management, Research Gate, December 2003.
14. http://ww.dewindia.org/html/water-supply-history.asp, Bombay water supply history
15. http://www.maharashtra.gov.in/english/gazetter/greater_bombay/otherdepartments.html Maharashtra State Gazeteers
16. http://en.wikipedia.org/w/index.php?title=Vihar_Lake&oldid=516292226
17. http://www.observerindia.com
18. Lewis, Clara; "Delhi, not Mumbai, India's economic capital – Times of India". The Times of India. Archived from the original on 14 February 2017. Retrieved 24 February 2017.

Certified as
TRUE COPY

Principal
Ramniranjan Jhunjhunwala College,
Ghatkopar (W), Mumbai-400086.