

**EFFICACY STUDY OF MANDATORY RAIN WATER HARVESTING
POLICY IMPLEMENTATION BY BMC AS AN ALTERNATIVE WATER
RESOURCE FACILITY FOR MUMBAI CITY**

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ABSTRACT

Fresh water scarcity is becoming critical problem. The demand of water is increasing day by day not only for agriculture, but also for household and industrial purposes. From just 32mld (million litres per day) from Vihar Lake in 1860 for Mumbai's then population of only 0.7 million, according to data released by the Brihan Mumbai Municipal Corporation, the city's demand is 4,200 million litres water daily (MLD) but the BMC supplies 3,400 MLD, a shortfall of 800 MLD. for the city's 13 million people. The water supply to the island city was augmented through schemes on six water sources Vihar, Tulsi, Tansa, Modak Sagar, Upper Vaitarna and Bhatsa. As the population is projected to grow to 16 million by 2021, future water sources have been identified where dams are proposed to be constructed. But as dams submerge hectares of fertile land, villages and cause environmental degradation, and recurring expenses on maintenance of electrically operated system for pumping, Rainwater Harvesting emerged as a viable alternative for sustainable development. Thus on 14th Feb.2002, Water supply & Sanitation Department of Government of Maharashtra has issued a G R. approving Rain Water Harvesting as a means of improving water supplies. In furtherance Municipal Corporation of Greater Mumbai issued a Circular insisting provision for rainwater harvesting while developing plots having area more than 1000 sq mts, as I.O.D. conditions from 1st Oct. 2002. Brihanmumbai Municipal Corporation (BMC) in greater Mumbai also established RWH cell in 2006 to ensure implementation of RWH policy.

The present research study attempted to explore the efficacy of RWH policy implementation and conducted descriptive survey study in Mumbai buildings constructed between 2003 to 2014. The findings of the study revealed that except for few cases the idea never succeeded to any great

success. The study recommends serious social and environmental assessment adhering to the norms of Forest and Environment Act before approving dam projects and strict monitoring mechanism for efficient RWH policy implementation.

Key words: water source, rain water harvesting, policy efficacy,

Introduction:

The water supply to the Mumbai city through Vihar, Tulsi, Tansa, Modak Sagar, Upper Vaitarna and Bhatsa water sources. According to Brihan Mumbai Municipal Corporation, the city's demand is 4,200 million liters water daily (MLD) but the BMC supplies 3,400 MLD, a shortfall of 800 MLD, for the city's 13 million people. As the population is projected to grow up to 16 million by 2021, so water sources for future have to be identified. According to previous record construction of dam is one of the solution on this situation, so government approved dams proposals and constructed for water demand fulfillment, but because of dam construction activity submerge hectares of fertile land, villages, flora - fauna and causes environmental degradation.

Rainwater Harvesting is a viable alternative for the situation. Rain Water harvesting is a technology used to collect, convey and store rain for later use from relatively clean surfaces such as a roof, land surface or rock catchments. Water scarcity and Water demand for Mumbai city is meagerly fulfilled by RWH. Mumbai city average rainfall of 2,146.6 mm, & 2,457 mm in the suburbs, with an area of 437 sq km. So the city has the potential to harvest 2394.52 MLD of water. (Source: Centre for Science and Environment).

Mumbai pre monsoon water levels between 2 and 5 m bgl are observed in southern part, whereas 5 to 10m bgl are observed in northern part as well as post monsoon water levels of < 2 m bgl are observed southern part, whereas 5 to 10 m bgl are observed in north central part. For Mumbai city usually recommended Surface storage tank for RWH, because ground water level is very high to avoid mixing of saline water, In Other suburban areas where ground water level is little low Recharge pits used for RWH.

Department of Government of Maharashtra has issued a G R. insisting provision for Rain Water Harvesting from 1st Oct. 2002. BrihanMumbai Municipal Corporation (BMC) in greater Mumbai also established RWH cell in 2006 to ensure implementation of RWH policy, but there

is no serious efforts or mechanism to ensure implementation of policies by officials, so overall Government policies on RWH is ineffective.

The present research study attempted to explore the efficacy of RWH policy implementation and conducted descriptive survey study in Mumbai buildings constructed between 2006 to 2014.

Objective of the study:

To study the impact of destruction due to dam construction, as well as Rain water harvesting as an alternative of dam construction, so as to save biodiversity. During this study we analyze the functioning of the MCGMs RWH Cell, understand the hindrances (if any) in policy implementation & conduct a survey for analyze the extent to which rainwater harvesting scheme is implemented in the Mumbai city between 2006-2013. At last provide suggestions to popularize the practice of rainwater harvesting in the Mumbai city as a conservation measure and for sustainable development.

Methodology:

The study of Environmental impact assessment on degradation due to dam constructions in terms of hectares of land submerged, breeding habitat, flora and faunal biodiversity affected. Information collected from secondary data for respective sources (fisherman community, Forest department, water resources department)

Descriptive survey of public in housing societies which constructed during 2012 - 2014 on Thane Ghodbander road, regarding awareness related to RWH in general and about its policies introduced by government

Conducted survey of new constructions since 2006 in Borivali region and study compliance of RWH policy implementation

Collect secondary data from Rain water harvesting cell – Mumbai Municipal Corporation

Sample & Tool Administered

Sample- 500 residents (male and female adult) were selected randomly in housing society

Tool- Four point rating scale survey Questionnaire & Interview schedule

Result and Findings:

Around 12 dams to be built around Mumbai Authorization Area. Around 700 hectares of land, 1 lakh trees, & dams would displace more than 1 lakh people from Thane and Raigad.

No.	Municipal corporation	Dam
1	Bhiwandi-Nizampur Municipal Corporation	Kalu Dam
2	Meera Bhy. Municipal Corporation	Susari Dam, Surya Irrigation project
3	Vasai Virar Municipal Corporation	Susari Dam
4	Kalyan Dombivali Corporation	Barvi dam and Poshir Dam
5	Navi Mumbai Municipal	Balganga Dam

Environment affected of on-going and planned dams in Mumbai and suburbs

Dam	Submergence Area, Ha	Forest Area affected, Ha	Population affected	Environmental clearance required
Kalu (Part of Vaitarna)	2100	999 Ha.	3169	Yes, getting Environment clearance from MoEF
Shai	3040	494.1 ha. Land , 43000 trees to be cut	5124	Getting Stage I forest clearance on 2011.
Middle vaitarna	34733	760 (over 100000 trees cut)	8 villages (min. 1600 people)	Yes, submerging part of Tansa Wildlife Sanctuary. Cleared
Balganga	1240	265 Ha.	8000	Not applied for forest clearance with the MoEF, which is illegal.
Gargai (Part of Tansa)	900	750	3000	Yes, affecting part of Tansa Wild life sanctuary
Pinjal	2000	1188	NA	Yes, affecting part of Tansa Wild life sanctuary
Barvi	4442.03	1214 (reports)	3375	Forest clearance in 2000

(Source: MMRDA Regional Plan for Mumbai Metropolitan Region 1996-2011)

Government policies on RWH:

Year	Policies
2002	Maharashtra Gov. makes RWH mandatory for all buildings on plots more than 1000 sqm
2002	MCGM made RWH mandatory for buildings of plot more than 1000 sq m and granted water connections of only 90 lpcd as compared to 135 lpcd supplied earlier
2005	Directive by state government made RWH mandatory for all developers
2007	RWH under MCGM was also made mandatory for buildings coming to MCGM for additions/ alterations/ FSI TDR use, & the same provision became mandatory to buildings having a plot area of 300 sq mt and above

MCGM adopted a strict rule where the building proposal department will give NOC & occupational certificate only to those who have facilities for rainwater harvesting. Rainwater harvesting cell till June 2009, about 900 buildings were given occupational certificate which seem to have adopted the technique. The BMC has recently made an amendment in the municipal act whereby it has stated that all Future residential and commercial complexes above 5,000 sq meters should install water harvesting mechanisms.

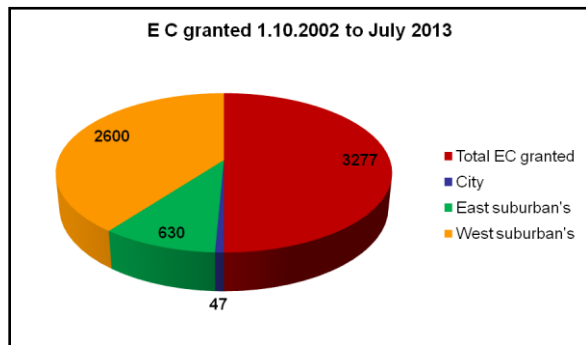
Survey on RWH. Scheme is implemented in the Mumbai city:

No	RWH scenario in Mumbai	Status
1	1 st Oct. 2002 to 31 st July 2013	Total environmental clearance granted 3277 building <ul style="list-style-type: none"> • City area: 47 no. • East suburban: 630 no. • West suburban: 2600 no.
2	From 2007 to 2013 (Seven years since the rule)	<ul style="list-style-type: none"> • New buildings: 6855 no. • RWH system installed: 3008 no.(successful ration 44 %)
3	Total RWH started in old building	<ul style="list-style-type: none"> • 400 no
4	RWH available in BMC school (Mumbai)	<ul style="list-style-type: none"> • BMC school: 144 no. • Available RWH facility: 70 no.(successful ration 49 %)
5	Bld. Plot area more than 1000 sq.m	RWH implementation ratio 44 %
6	Bld. Plot area more than 300 sq.m	RWH implementation ratio 43 %
Violations more rampant in the eastern suburbs than western suburbs		

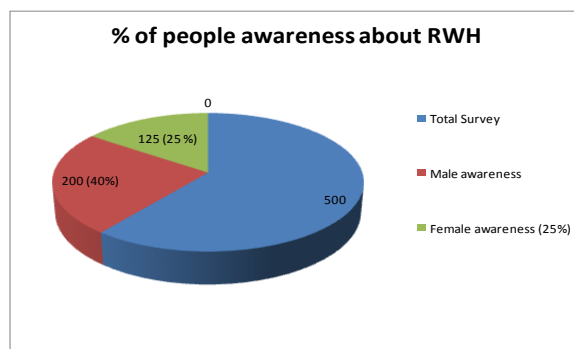
(Source: Rain water harvesting cell – Mumbai)

Survey of housing societies constructed during 2012 – 2014 (Thane Ghodbander road):

1. New buildings: 43
2. RWH system installed: 22 no. (Successful ration 49%)



E. C granted for construction projects



People survey in housing societies (500 no.)

Findings:

1. Impact on biodiversity due to over damming to fulfill water scarcity, as hectares of land submerged affecting overall flora & fauna.
2. Though Mumbai city average rainfall is 2,146.6 mm, & 2,457 mm in the suburbs, and has the potential to harvest 2394.52 MLD of water during monsoon seasons, unfortunately there is least efforts by authorities to explore alternative sources.
3. Survey study reveal low level of awareness among housing societies about importance and norms of RWH- males (40%) awareness was found better than females (25%)
4. Efficacy study of Government policies of alternative option for water resources show low perception among the public (30%) and authorities (50%).
5. Empirical findings show that only 10% RWH scheme is implemented in the Mumbai city between 2006-2013.
6. Overall Government policies on RWH is ineffective. Successful implementation ratio is 44 % (Source: RWH cell, BMC,)

7. There is no a serious effort or mechanism to ensure implementation of policies by officials (e.g. BMC itself did not implement 100 % RWH plant in BMC offices)

8. Builders maintain RWH plan on paper but never implement it, as Occupational Certificate is issued despite of non compliance of norms.

Conclusion:

The concept of conservation of water resources can help to handle with the global water shortage. Rainwater harvesting system is one of the concepts which can solve water shortage problem upto certain level. Government must ensure optimal use of every option for water resource before approving any dam project .To popularize the practice of RWH in the Mumbai city as a conservation measure and for sustainable development, Government organizations (Rain water harvesting cell – BMC) use legal provision, to the installation of recharge facilities mandatory. Authorities must study and identify type of RWH system suitable in context to Mumbai city and nearby areas and accordingly help in installation. State level environment committee (SEAC / SEIAA) should be making some strict criteria for RWH before issue environment clearance to the construction project and strict monitoring mechanism for implementation of policies of alternative water resources. Government agencies are playing an important role to promote this practice & Organize Mass Awareness Programmed involving district administration and NGOs to educate in different sections of users.

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