A CRITICAL REVIEW OF FLOOD CONTROL AND MANAGEMENT POLICIES-AN IWRM PERSPECTIVE

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Abstract -- **Chennai, the capital city of Tamil Nadu in India, has witnessed very fast urbanization. During the last two decades the study area Velachery has witnessed rapid growth and change in land use pattern. The land use change is strictly not in accordance with the Chennai Metropolitan Development Authority's (CMDA) Development Control Rules (DCR). Encroachments in the water bodies and water courses also add on to the problem of flooding. So the study area is severely flooded even during a very low precipitation. The flood discharge from the Velachery area has to drain into the Pallikaranai swamp. It receives surplus from 96 tanks which were originally meant for storing water for irrigation and is completely defunct now. Due to heavy inflow into the swamp from the catchments during floods the swamp swells causing afflux so that the discharge from the study area is not able to readily enter into the swamp. This is the root cause for flooding in the study area.**

Both the National Water Policy, 1987 (revised in 2012), and Tamil Nadu Water Policy, 1994, suggest mitigation measures for flooding. This study focus on finding causes for flood-related issues. It critically tries to investigate whether the water policy on flood mitigation and management has been implemented properly in letter and spirit. This study aims at Integrated Water Resources Management (IWRM) concept. It involves the collection of secondary data from various Government sources and through semi-structured interview and Focus Group Discussion (FGD). Then the data have been analyzed in the light of the Tamil Nadu State Water Policy, 1994, and some conclusions are drawn and presented in the study.

Key words: Encroachments, Swamp, Mitigation, Afflux, Precipitation, Contiguous

1. INTRODUCTION

Chennai, the capital city of Tamil Nadu, has been expanding on all four directions after 1950s. Particularly in the last two decades the city has witnessed fast urbanization and industrialization. This provides lot of employment opportunities in the construction industry to skilled and unskilled workers. Due to this, there is an ever increasing population growth and the pressure on land use within the CMDA. Even though there is a development plan prepared by the CMDA, the actual development is not happening strictly, as per CMDA's master plan [2][4]. This leads to encroachment on water bodies and water courses, unplanned laying of roads against natural slope in unapproved layouts and construction of buildings over and above the coverage area specified by CMDA. These activities lead to severe floods during heavy precipitation, causing inundation of dwelling areas. In 2008, more than five lakh people were affected in Chennai and its suburbs after rain-fed rivers and lakes inundated almost three-fourths of the city *(The Hindu, dated 9th July, 2008)*.

2. OBJECTIVES

(i) To analyze the policies formulated and implemented towards flood control and management, flood protection and forecasting and

(ii) To suggest improvements / modifications in formulating better strategies.

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3. STUDY AREA AND METHODOLOGY

Velachery is geographically located at latitude of $12^0$59'18.32" S and a longitude of $80^0$12'45.70" E and having a population of about 35,000. It is located in the southernmost part of Chennai Metropolitan Area (CMA). The Velachery watershed by nature is located in a low lying area compared to the other watersheds of CMA which is shown as Fig.1.

The Velachery Lake is situated in the northern part of the study area, which had a vast water spread area of around 0.98 Mm^2 originally. When 50% of the Velachery lake water spread area was reduced due to urbanization, the capacity of the lake was also reduced nearly to 50%. This was done based on the request of the Tamil Nadu Housing Board (TNHB). So 50% of the area of waterspread relieved off submersion was occupied by TNHB for laying out of developed residential plots. The surplus of the lake was usually flowing over the urbanized area as there was no defined course for the flow. So the Water Resources Department (WRD) has constructed a concrete drain from the lake upto the swamp through which the water is to be drained. Now the problem of flooding in the study area is, the excessive runoff coming from the western side areas like Ullagaram, Adambakkam, Nanganallur, Palavanthangal and Thalakananchery tanks. Out of these five tanks which were in existence, four tanks are completely defunct. Only one tank, namely, the Adambakkam tank is sick with 10% of the storage. So the runoff that was to be absorbed by the defunct tanks and the sick tank comes as flood to the study area. The methodology of the study is furnished as a flow chart given in Fig. 2

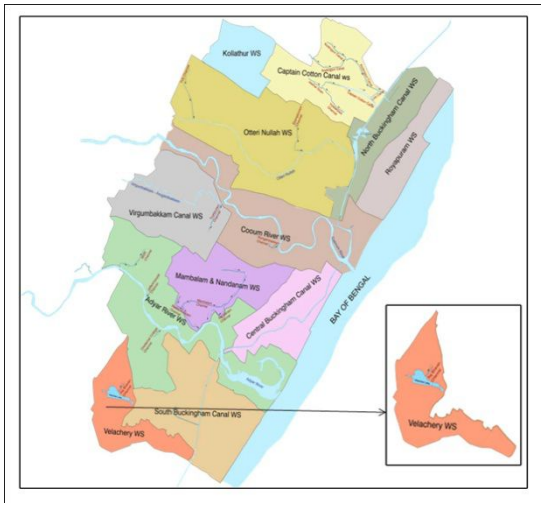

Figure .1 Velachery Watershed Map

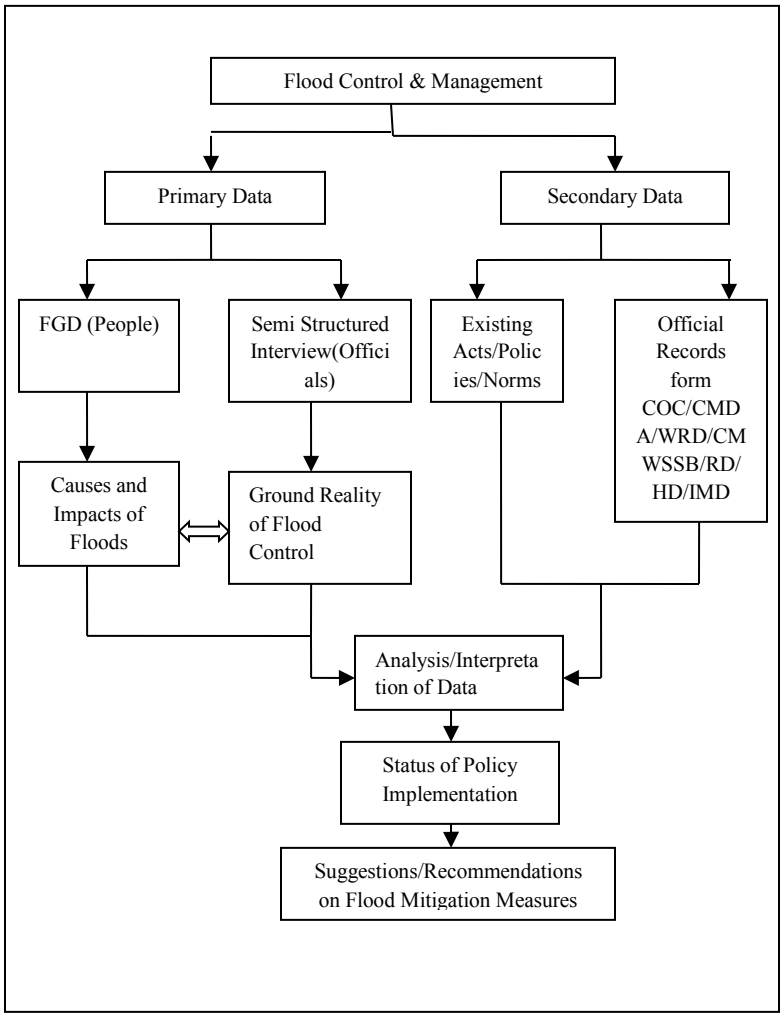

Fig. 2. Methodology Flow Chart

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4. RESULTS AND DISCUSSION

As per IWRM perspective the result has been furnished under three aspects viz., technical, environmental and socio-economical.

4.1. Technical Aspect

Out of the total 96 irrigation tanks draining into the Pallikaranai Swamp, 5 tanks namely, Adambakkam, Ullagarm, Nanganallur, Palavan Tangal and Talaikananchery

tanks are directly contributing to floods in the study area. The balance 91 tanks are indirectly responsible for flooding in the study area by causing afflux in the swamp. This afflux prevents the flood in the study area from entering the swamp.

The total maximum flood discharge directly coming through the study area to be drained into the swamp is 110.79 m^3/sec. But the maximum flood discharge of 91 tanks other than the tanks in the study area is 354.44 m^3/sec. During floods the discharge from the 91 tanks directly enter the swamp causing an afflux in the swamp which prevents the maximum flood discharge of 110.79 m^3/sec realized in the study area from entering the swamp as the study area is naturally at a lower level. This is the root cause for flooding in the study area.

4.2. Environmental and Social Aspect

The outcome of the FDG on environmental and social impact is furnished below

- The development in the past two decades is not in conformity with the topography of the study area.
- The roads have been laid at a higher level without providing any cross drainage works.
- The defunct tanks and partially encroached tanks in the upstream were cited as reasons for flooding in the downstream area.
- The non-availability of storm water drains [11] is said to cause inundation during monsoon.
- The Veerangal Odai, a major drainage course in which the entire outflows of the study area and other contiguous areas have to be drained off was heavily

  encroached. Currently this is being taken up for restoration by Public Works Department (PWD) towards mitigating the flood.
- During the 2005 historic flood, the storm water collected from the areas south of Madipakkam, Tambaram-Velachery road, which was huge in quantity travelled to the north upto Velachery, inundating large areas in Velachery. The flood has been now averted by raising the Madipakkam road considerably.
- During the 2005 and 2008 floods, in some areas the water has entered the houses upto the level of 0.9 m and people have struggled without electricity for five days and the essentials like milk and bread were supplied by the Resident Welfare Associations to the affected areas.
- People who did not construct first floor have moved to safer places like temples and relatives' houses. Rescue operations were carried out by Police and Associations by boat and each household was given Rs. 2,000/- as flood relief.
- None of the people are aware of the flood mitigation and management strategies in the State Water Policy [15] prepared by the State.

4.3. Economical Aspect

For providing cash relief for the flood victims during November 2008, the Government of Tamil Nadu has sanctioned a sum of Rs. 100 crores as per G.O. Ms. No. 677 Revenue (NC2) department dated 28/11/2008, under which a

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sum of Rs. 2 crores has been allotted to Chennai Corporation for providing cash doles for the affected people. In the study area the exact number of people who has received the cash dole was not available. But almost all the ration card holders in the affected *wards* have received the cash relief.

Administrative approval has been accorded by the Municipal Administration and Water Supply Department under G.O. No.116 dated 06/07/2009, for an amount of Rs. 778.29 crores. The works have to be taken up by Corporation of Chennai's (CoC) and it is partly under progress. In that amount, 35% is contributed by Government of India, 15% by

Government of Tamil Nadu and CoC share is 50% (Rs. 389.15 crores), out of which South Chennai area has been

allotted a sum of Rs. 130.89 Crores. Of this the exact amount allotted to the study area is not available from any source.

In respect of the macro-drainage works approved under Jawaharlal Nehru Urban Renewal Mission (JnNURM) G.O. No. (MS. No. 240 P.W. (K1) Department) dated 16/10/2009; the amount allotted to Water Resources Department (WRD) for the construction of macro-drains is Rs. 633.03 crores. The fund has been provided by the State Government to relieve Chennai city from floods, which is affected by flooding due to frequent heavy rains and rapid change of entire land use, because of unauthorized constructions and deviations and violations in the authorized and unauthorized constructions. Out of the amount allotted for the Southern and Eastern basins for WRD (i.e. Rs. 466.45 crores), an amount of Rs. 260.80 crores, is to be spent in the areas which are directly and indirectly connected in providing relief from flooding of the study area. Out of these, works in respect of Veerangal Odai is under progress, which was witnessed during the field visit.

5. CONCLUSIONS

- The policies of the Government / local body are not reaching the grass root level. A common man is unaware of the policies including the Tamil Nadu Water Policy, 1994, and its provisions on flood mitigation and management. It must properly reach all the common people.
- The Tamil Nadu Water Policy, 1994, which speaks at length about flood mitigation, is not known to the subordinate officers of WRD and officers of other departments. This policy has not been circulated to the grass root level and only a few copies of them are available in the offices. The policies need to be circulated and be made available to all.
- The implementation of the Tamil Nadu Water Policy, 1994, with respect to flood mitigation and management is facing lot of hitches while executing them in the field.
- The present macro-drainage scheme now being provided, may not be sufficient in view of the anticipated flood worked out in the study. Further, proper mitigation works need to be provided in future.
- The widening of the South Backinghum Canal from Adyar to Muttukkadu to carry an increased discharge under JnNURM would reduce the afflux of the swamp and enable entry of flood waters from the study area into the swamp. This project should be properly maintained to increase the effectiveness for every monsoon period.
- The works of desilting and widening of drains by WRD before and during monsoon in the Pallikaranai swamp and Muttukkadu estuary has been very useful temporarily for providing relief from floods, as reported by the stakeholders. So these works must be carried out in each and every year by WRD.
- The micro-level drains provided by the CoC might not provide a complete relief from the inundation problem of the study area, as they are meant to relieve the submersion of local patches. So the CoC must give attention for constructing macro-drains based on further flood events.
- As per Second Master Plan [14], the Government should provide a healthy and disease-free life to the people by

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making policies. But during floods, people in the study area are often facing an unhealthy condition. Now only the State Government has introduced a health insurance scheme to the poor and downtrodden to achieve this. So effective implementation of this scheme should be done by the Government to achieve this aim.

- The enormous power vested with the Government of Tamil Nadu (GOTN) to ratify any development which is not as per DCR is the reason for many unplanned developments mushrooming in the CMDA area. Instead of implementation of a command and control approach, the Government may appreciate the bottom up approach which could bring in the views of the common people as well as the line departments in taking up decision.
- The India Meteorological Department's (IMD) weather forecast gives a good warning against probable flood and inundation. Awareness must be created among public to relay upon the media for weather forecasting.
- The rain water harvesting system must be adopted properly for all type of buildings and along the bridges, so that it could minimize the inundation of rain water and simultaneously increase the groundwater level.
- The rain water recharge pits must be provided for every 30 m distance during the laying of new roads, so that it could relieve inundation of the area.
- In general the policies, rules and norms of the various departments exist only in black and white, and are known to a few bureaucrats. Only a few of them is reaching the grass root level including a common man. So efforts need to be taken to overcome this shortcoming.

To sum up, the study revealed that the policies lie only in records with the Government and they have not reached sufficiently to those who actually need it. The flood mitigation implementing agencies are too many and the inter departmental coordination is lacking. The eviction of encroachment in the waterbodies is not properly implemented by WRD as the WRD officers are vested with executive powers only. If some judicial powers under delegation of powers like the one granted to the forest department are given to WRD, the eviction of encroachment would be effective and this could go a long way in mitigating the floods in the study area and elsewhere in the State. Developments and extension of areas should be in confirmation with DCR. The master plans should be based on a holistic approach taking into account the future projected demand. Community should be given the awareness that improper garbage disposal leads to the clogging of drainage path which adds on to the fury of floods. It is high time that stringent rules are enacted and enforced to curb the violation against the conservation of the wetlands.

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