

Analyzing how Governance models plays a key role in flood risk management?

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ABSTRACT

Human communities and their activities are depended on their surrounding environment in which climate plays a major role. The living beings are sensitive to climate as they life and create livelihood based on it. Climate is versatile, its unpredictable character for natural reasons, always made human societies to adapt strategies depending on the extremes of the climate and weather. Floods are the most recurring natural calamity in many counties and India ranks first in the human lose category due to calamities out of all. It is not possible to eliminate the floods, but it is possible to minimize the damage and the risk potential. In India, disaster management plays a key role for risk control and the management. But due to lack of deliberative governance, the efforts of the National disaster body never achieved its goals. Urban Floods shows how the poor governance can create a major risk which results in social, economic, and environmental losses of the city. Cities like Chennai, Mumbai, Kolkata is experiencing extreme floods due to lack of proper risk mitigation and city planning governance issues. To understand flood mitigation in India, the disaster management governance model of India is analyzed with other countries to understand the merits and demerits of our governance. For the pilot study, present risk management plans of Chennai is assessed using the flood risk management framework to know how effective the management is and the paper's aim to recommend and implement an effective governance model to reduce the impact caused by the floods in Indian Cities.

Keywords: Governance models, Disaster Management, Flood risk management, Indian Cities.

I. INTRODUCTION

Developing Countries like India deal with climate change challenges which hampers the goal of achieving Nation's sustainable development. The rising frequency of disaster occurrence has affected our ecosystem which directly or indirectly disturbed our livelihoods. India is one among of the highly climate sensitive nations. Its enormous geographic range along with its diverse climatic areas, resulted in its vulnerabilities to climate change risks (IPCC, 2013). The United Nation report states that the loss of human lives due to disasters have been low but the occurrence of the events have been rising (UNISDR I. S., 2004). In 2001 the earthquake in Gujarat Bhuj triggered the Disaster Management bill to pass but got established when India experienced Tsunami in 2004 (UNISDR, 2015) and in 2005 Disaster management Act has come into implementation. The need of strong governance for prevention and mitigation is always required and now it is more essential, which have a scope to adapt strategies by evaluating and then creating policy depending on the context rather than wholistic approach. To achieve flood resilience, the nations should have a approach of risk management governance where the nation should have appropriate resistance capacity where the capacity can absorb, recover and to adapt according to context (Peter P.J. Driessen, 2018). Depending on geographical location the settlements either urban or rural, have several issues to mention on the bases of their vulnerabilities based on disasters, hazards, climate change

and other factors.

The operational approach for the risk management should be exclusive to individual context to map by assessing the risk and vulnerability to make scalable and effective risk management plan. Cities are been the most sensitive zones for risks and are been recognized for risk management from past few years.

In the developing countries it is found that the Urban areas are experiencing the disasters due to rapid growth of population is inversely proportional to the infrastructure growth resulting in the discrepancy in disaster management and its adaptation (Hunt A, 2011). Among the natural disasters, floods standing among the top disaster in which human loss is huge. The human loss and the damage caused by flooding showcases that the adaptation and mitigation level are poor which are caused due to incompetence in disaster management and alertness (Correspondent, 2020). In India, the decline in seasonal rainfall, change in precipitation levels results in increase in the occurrence of Floods and droughts in the present and future scenarios. The Chennai, floods can be an example of how floods can damage the social, economic and environment of the cities. The Government of India has stated that Chennai is in the National Disaster zone and the most of the flooding's in Chennai are categorized as a man-made disaster (Lavanya, 2012). The IPCC declares that human-stimulated climate alter is taking place. The rapid residential growth, development of industrial areas, development of infrastructure sectors in eco sensitive zones like flood hazard areas led to loss of vegetation, lack of planning without considering natural contours and natural drain resulted in decrease in procurement areas which are now leading to flash floods during high rainfall and monsoon. If this tendency continues, it will intensify the trouble of flooding in the future. A detail interpretation and evaluation of land use change and its effects on the watershed hydrologic activities, is very essentials for the forecast and mitigation of hazards caused by flood and planning, sustainable development, and management of the watershed (Calder, 2010). Governance model plays a vital role in the managing the risks of human, environment and economic lose due climate changing. Chennai can be an example for analyzing the positives and negatives in governance and management models.

II. Understanding the Role of governance structure in flood risk management

2.1 In India

It is expected that the governance organization supports and strengthens the development and application of disaster risk management with varied integrated policies by considering all appropriate levels stakeholders, strategies, insights, and resources (Joanne Vinke-de Kruijif, 2015)

In India, National Disaster Management Authority is under an Act of Parliament, December 2005 where the chairman of the nodal agency is Prime Minister of our country. The Act aims for the effective management of disasters and for matters associated therewith. Disaster management plans for floods, drought etc., are designed under disaster management authority. The National Disaster management structure shows us the hierarchy of the departments and governments in Figure 1. The National Disaster Act, 2005 implementation has been slow and ineffective.

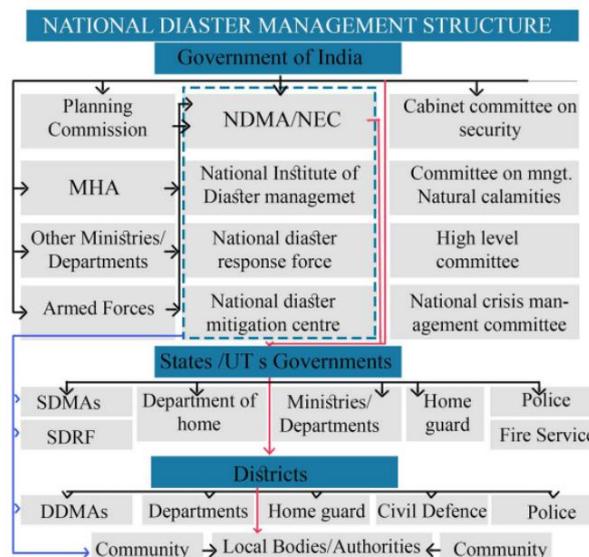
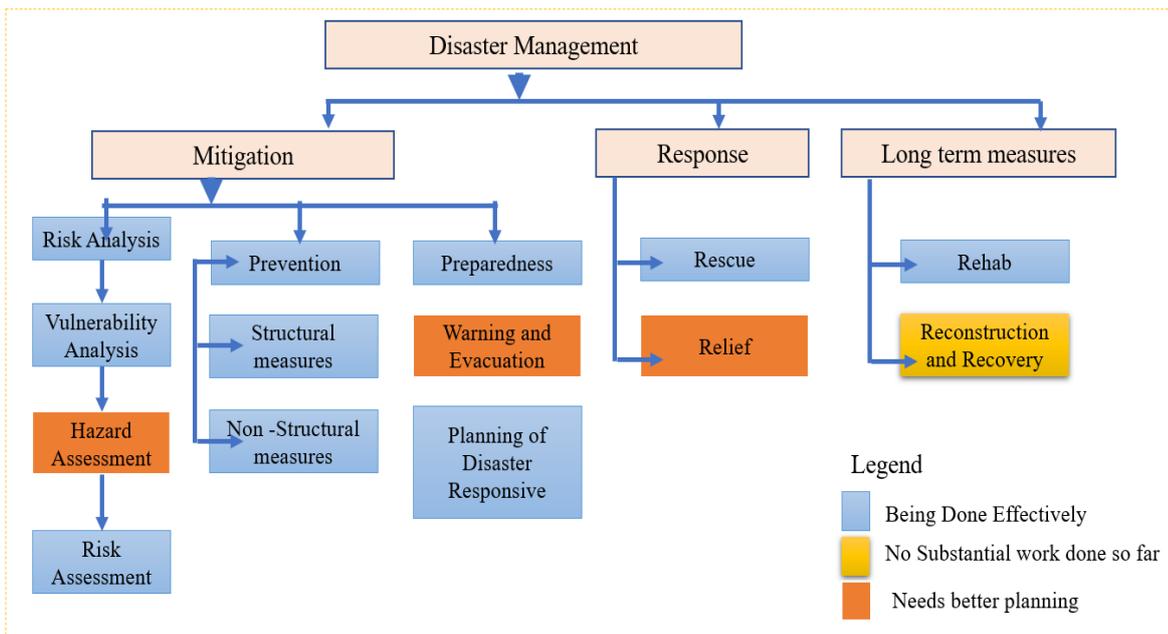


Figure 1: National Disaster Management Structure

(Khanna, 2019)

Under the act, the state Chief Minister plays a role as the chairman and in the district, collector acts as a chairman and they select the members. The structure lack in inducing NGO's and citizen participation for the decision-making process and so it is alleged that the "Act became a law almost at the will of the bureaucrats who framed it.

This can be proved in the case of the Chennai and Mumbai flood and recently Kerala Floods where floods are termed as manmade disasters rather than natural made due to the man intervention that leads to the disasters (Lavanya, 2012). And India tops first in the human loss in disasters because the system does not include NGOs and Citizen Participation which would have helped in social learning in the reasoning of core reasons for floods. In 2013 Indian Supreme Court, issued warnings notice to the Governments of Uttarakhand, Andhra Pradesh, Gujarat, Tamil Nadu, Odisha, Maharashtra, Rajasthan and for the Central government for failure in



implementation of the Disaster Management Act, 2005 as in response to a Public Interest Litigation. (Economic Times, 2017)

Figure 2: Steps taken for post disaster and pre-disaster. (Khanna, 2019)

The main issues with the process of planning for the risk management plans are the authorities not experimenting with new processes, not taking community experiences, not open to knowledge from communities and NGOs. Deliberative governance is the most effective to attain sustainability in dealing with natural and man-made disaster risks. The method seeks communities at risk to get involved in all its phases of top-down process like from prevention, mitigation, preparedness, response, and recovery. For disaster resilient communities, community members must be empowered first to survive with the adverse effects of natural hazards (Brown Munene, 2018).

2.2. Bangladesh

In Bangladesh Flood is a yearly incident. Consistent river floods affect nation 20%. Approximately 37%, 43%, 52% and 68% of the country is flooded with of return periods of 10, 20, 50 and 100 years correspondingly. This is one of the best examples which involved the community in all the stages until the plan is finalized and it has seen the drastic change in the reduction of human loses in its disasters. To manage the disasters there is a necessity for correct adaptations at the level of community. The Government started promoting through primary schools as the school facility is provided at every corner of the nation, to promote and publicize the knowledge to inculcate a daily life change to survive with the changed situation and to persist with the problem. Through this top-down process, the governance is making citizens self-sufficient to react during disasters and even governance is open for knowledge gain for policy making and plan implementation.

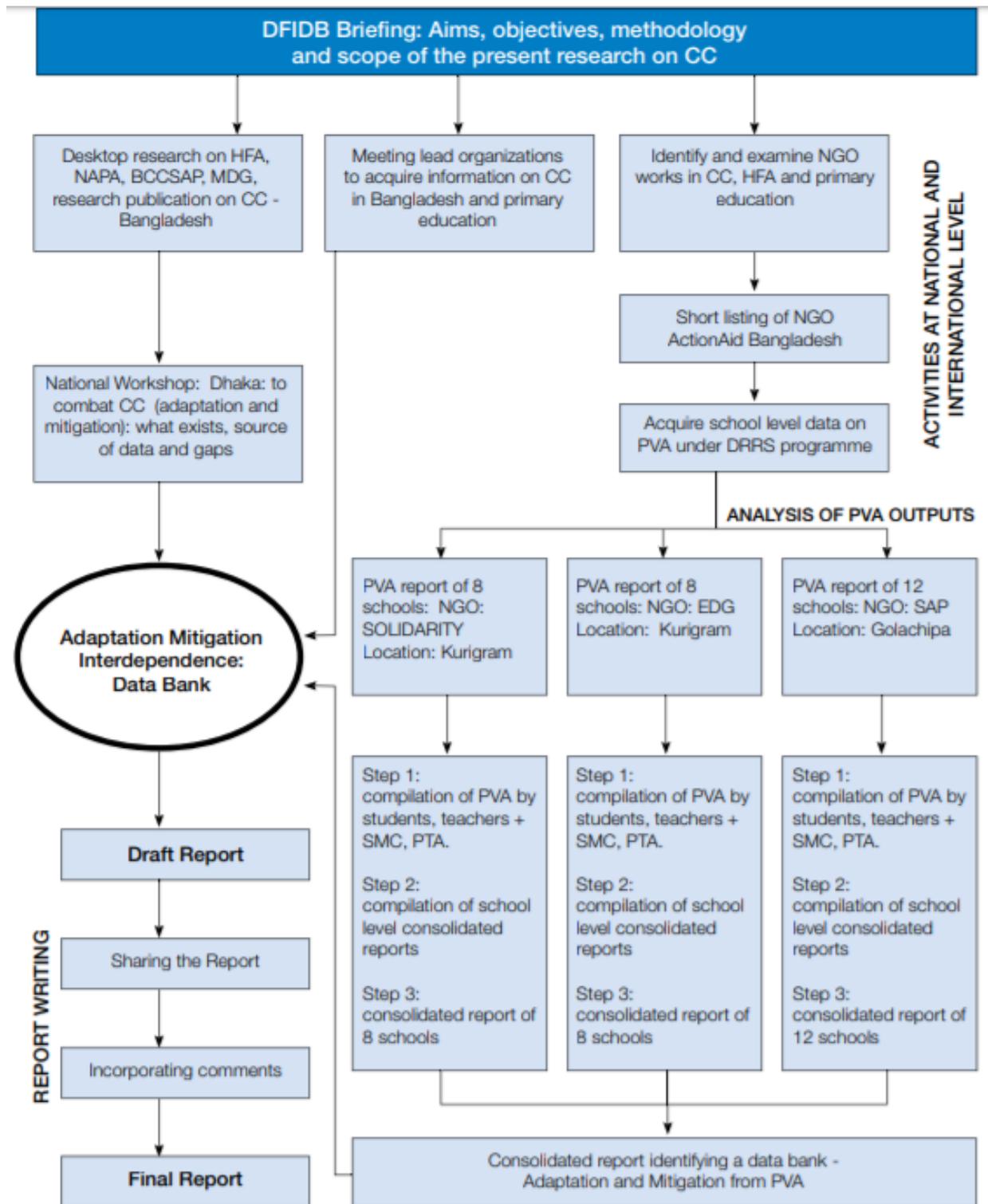


Figure 3: The adaptive governance model of floods in Bangladesh (Das, 2010)

2.3 Triple loop learning framework for governance.

The framework triple loop learning which is famous for Dynamics of governance methods as learning procedures.

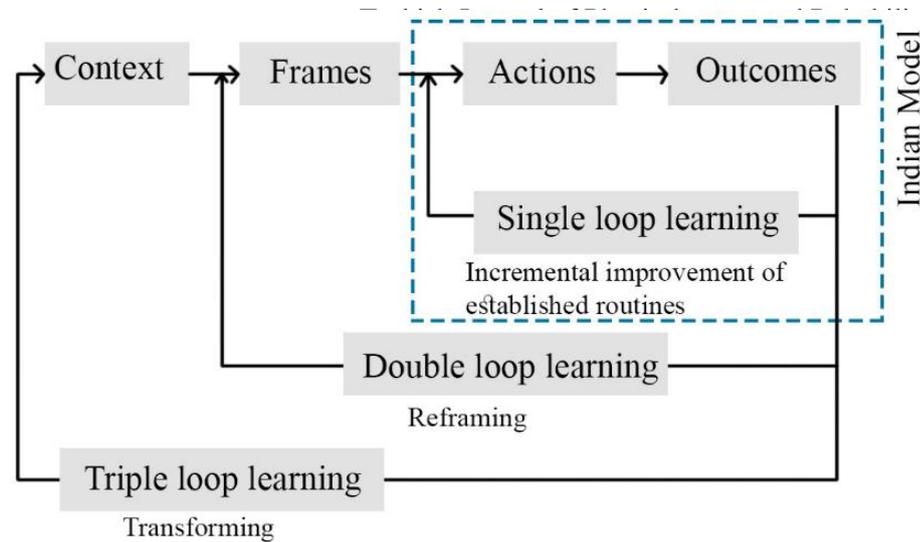


Figure 4: Sequence of learning cycles in the concept of triple-loop learning (derived from Hargrove, 2002). (ClaudiaPahl-Wostl, 2009)

The framework is characterized by a wide-range interpretation of social understanding that is rooted in the more instructive components of the social sciences. The structure revolves around processes of multi-party relations, rooted in a specific public and ecological structural perspective and leading to specific results. This adaptive governance model helps in understanding the root causes of the disasters and helps in deriving solutions from the stakeholders, as the model emphasis on area and the disaster context.

3. Comparison analysis of Indian risk governance model will be done along with Netherlands, Bangladesh.

Factors	Country			Inference
	India	Bangladesh	Netherland	
Citizen participation	Sometimes	Yes	Yes	Obligatory for efficient FRM
Stakeholder analysis	Weak stakeholder analysis	Strong stakeholder analysis	Strong stakeholder analysis	Imperative
Scale	Short term goals like upgradation of infrastructure	Long terms gaps	Long terms goals in FRM	Flexible to local level
	Non-scalable	Scalable	Scalable	
Mapping	Done by government and experts	Done by community participation along with government and experts	Done by government and experts	To be scaled down to local level
Decision making	Govt. based	Community based and experts based	Different authorities and expert based	Involve and communal based

Table 1 Comparison of risk governance model of different countries

From the comparison we can understand that Indian governance model is lacking in deliberative governance and is rigid by without involving citizens to understand the fundamental problems of the disasters and leading to

deficient in capacity to adopt, absorb and restore for risk managements.

4. An overview of how governance is one of the reasons in Chennai Floods.

An analysis study done by Chandan states that the change in land use pattern from past in 4 decades shows that the 20 times increase in total urban area which is done by converting the agricultural areas, open space. It has been noticed that green cover has noticeably declined from 70.47% to 35.53% and non-vegetative areas (built up, paved areas etc) have raised from 29.53 to 64.47%. The reasons identified for Chennai frequent occurrence of the flood are (a) unrestrained urban sprawl and loss of natural drainage. The blockage and encroachment of water bodies like drains, lakes, rivers. The water bodies eco systems are polluted, and the rate of flow is affected leading to the out spill and flooding from them (Sirajuddin Ahmed, 2016). (b) Improper and insufficient storm water drainage system and absence of maintenance. 855 kms of storm water network is only laid for 2,847 kms of urban road (Drescher A, 2007). (c) Surge in impermeable surfaces. (d) Lack of agencies coordination, no proper cohesive flood control management agency that incorporates the functions of Corporation, Development Authority, Public Works Department, Slum Clearance Board, Housing Board, etc., adds to weak points. This is the usual observation in majority of cities in India and is the fall in 30% of wetland areas from past five decades. Wetlands are useful ecosystems and are beneficial in enhancing water quality and collecting floodwaters and slowly releasing as they travel downstream (Melesse AM, 2006).

In 2007, Chennai Municipal Authority have developed a 2026 Vision to achieve a comfortable, lively, economic, and environmental sustainability for future generation. Chennai have initiated City River conservation project to improve waterways, with estimated and other projects started with a budget of 17,000 million which resulted in and ground water level rise. In 1988, with economic assistance of government, a alleviation scheme for floods have been launched with 3000 million budget. In 2017 investigation and assessments it was noticed that the improvements are not seen entirely as said by authorities. The government is not held responsible and transparent to citizens in risk management and mitigation plans and citizen participation is not completely encouraged. (Nair, 2010)

To understand the effectiveness of the management and to analyze the citizen participation, a survey has been taken up using Google form for Chennai residents. 100 have been responded. The survey focusses on the citizen participation and governance role in risk management.

4.1 Summary of the survey answers are:

Q.NO	Questions asked	Responses from 20 Chennai Citizens
1	How long are they residing in the city	54% from more than 10 year. 10.3 % from 6 to 10 years, 15.3 % from 3 to 5 years and 2.5% between 0 – 2 years.
2	Does your area flood during heavy rains?	51% floods all the times. 32.2% sometimes and 17 % no
3	Were you a victim of flood?	85.4% yes and 15.6% no
4	Do you know to whom you should report about flooding in your area?	43.6 % Yes, 53.8 % no, 1.2 % not sure
5	Do you know that your city has Disaster Management Plan or Risk management Plan?	66.7 % no and 33.3 % yes
6	Were you warned about floods by government before it created a problem?	61.5 % yes and 39.5 % no
7	Do you think government encouraged citizen participation in preparing your city flood management plan?	51.3 yes, 46.2 % no and 2.6 % no idea

8	When was your area flooded last time	42.9% last 6 months,17.1% last year, 12.9% 2 to 4 years back, 5.7% 5 to 10 years back,21.4 % before 10 years
9	Did government helped your area as soon as it flooded?	80% yes 20% no
10	Who helped you initially during flooding?	22.8% government, 28.5% neighbors, 3% NGO, 43 % all three
11	After flooding, Did Government survey was taken for analyzing why your area was flooded?	Yes Asked about causality, diseases, damaged houses
12	Do you think your area got developed to avoid flood	70% no, 30% yes
13	What steps were taken to avoid flooding in your area	17.9%- Infrastructure, 10.1% Citizen participation,38.5%- No steps were taken,12.8%- other steps,20.5% Both infra and Citizen participation
14	Were you trained how to manage during floods by government agencies?	71.8% no, 10.3%- By own interest, 5.1% yes, 7.7%- Schools, 5.2%- NGO's
15	Do you know that you have right for participation in decision making of Risk management Plans?	30.8% yes 69.2% no

From this survey we can state that there is no 100% citizen participation in the decision making or any knowledge exchange between governance body and citizens. There is no proper way of analyzing the core problems of the risks. So, the governance model is still rigid, and it must change into adaptive and three-loop learning where knowledge is exchanged and strategies are taken by involving NGO's, Citizens, and the experts.

4.2 Evaluating Flood risk governance of Chennai.

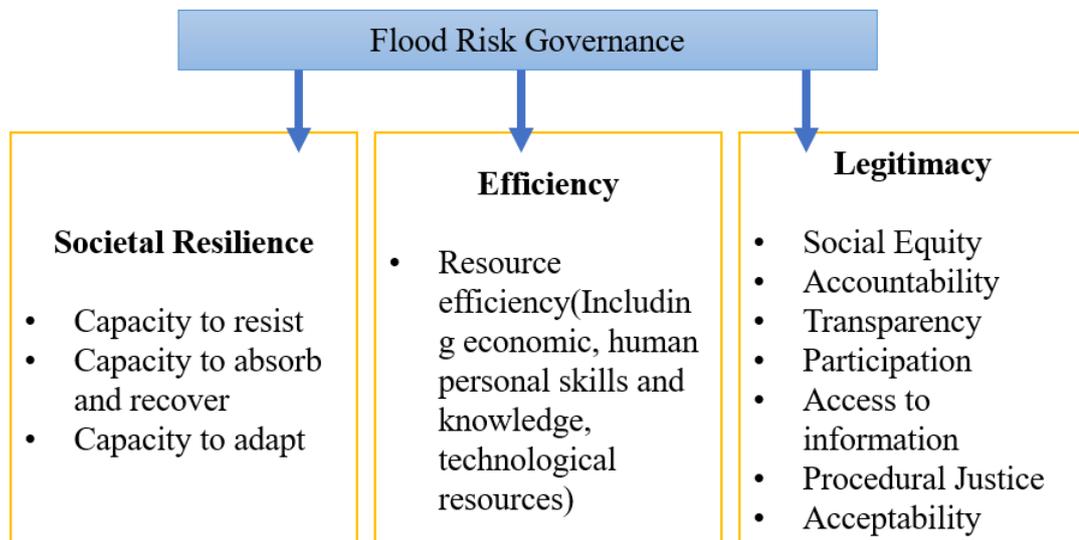


Figure 5: Evaluation Framework for flood risk management governance. (Meghan Alexander, 2016)

This framework aims to evaluate the flood risk governance model by understanding the arrangement of governance to achieve societal resistance and examine effectiveness and authenticity. After the Chennai floods in 2015, the state government has recently formed flood management plan to make Chennai resilience city and the plan is still in its initial stages and implementation was not started. Evaluation of Chennai flood risk management would help in understanding the positives and negatives in the governance model and the management.

The evaluation of the flood risk governance for Chennai city is carried out by the framework proposed by Alexander.

4.2.1 Criteria for Evaluation –

4.2.1.1 Societal resistance

a. Capacity to resist – Chennai Governance Restricting aspects of flood risk.

The Union government has refused Chennai's request of funding for storm water drain projects to establish flood mitigation, the State government has requested World Bank for the financial support, an estimated cost of ₹4,034 crore. The project would lessen inundation, water bodies integrate, recharging groundwater and enhance public health conditions. Budget revenue for maintenance is allocated yearly and lacks the guarantee of the upcoming year financing programme new developments. (Hindu, 2018)

b. Capacity to absorb and recover - Restricting aspects of flood risk governance in Chennai.

No attempts to encourage citizen engagement in FRM during risks. Hundreds of additional soldiers and relief workers were deployed to the flooded city of Chennai on Saturday, as residents said the government has been too slow to respond (Sanjeev Miglani, 2015).

c. Capacity to modify - Encouraging aspects of flood risk governance in Chennai.

Catchment area plans of Flood Management assistance strategic decision-making over a 50–100years timescale – Flood Management plans are prepared which is still in process for approval. Mapping of lost and present water bodies are done on present Google earth.

4.2.1.2 Efficiency

d. Resource efficiency – Encouraging feature of flood risk governance in Chennai.

The flood risk mapping support by Centre's Department of Science and Technology and Survey of India is financed by Water Resources wing of 217crores adopts the technology of GIS mapping. This project is handled by Anna university Institute of Remote Sensing (IRS), Chennai.

4.2.1.3 Legitimacy

e. Accountability – Restricting aspects of flood risk governance in Chennai.

The reasons for flooding are many. The land use plans, no preservation of wetlands, illegal constructions on water bodies and opening of dam gates during heavy rain – many are responsible, but they are not in a variety of legal actions due to political involvement.

f. Transparency – Encouraging aspects of flood risk governance in Chennai.

Chennai FloodManagement.org has launched in mid of 2016 to assist cooperation and communication of data that will reduce the impact of floods events in coming years of Chennai. Mapping can be done by citizens and data can be upgraded by them (Express, 2018).

g. Access to information – Encouraging aspects of flood risk governance in Chennai.

Flood risk information is publicly available (Flood management plans and flood prone maps in Disaster management book – Chennai). But the maps are still in initial stage of preparations.

h. Acceptability – Encouraging aspects of flood risk governance in Chennai.

Public discussion and involvement processes are broadly used to enable understanding and approval of FRM schemes. Citizen consumer and civic Action Group is formed for empowering citizens' rights in decision making.

III. CONCLUSION

From the analysis, it is understood that Indian Disaster Management stakeholder chart shows government officials, experts, NGO's, and Community as the Stakeholders. But in realism there is no NGO participation and Citizen participation in disaster management evaluation or in later stages. These uneven powers of stakeholders are the results for the Floods and other disasters as they fail in mitigation. From the analysis of Chennai flood risk management, it can be understood that India lacks in descriptive, adaptive governance as citizens are involved in www.turkjphysiotherrehabil.org

only initial stages of decision making or problem-solving, and citizens are not informed in later stages of decision making and plan implementation. Preparation of Topography maps, reducing contamination and blockage of water bodies, regulating planning and activities in eco sensitive areas, creating water shed management plans, Public awareness and Capacity building are some of the steps to be considered for better flood disaster management but these factors are not achieved in 100 percent, the process of top down is seen in Indian management plans. So, for Indian disaster management plans are not able to secure its aim to reduce the flood risk in urban areas. By adopting the adaptive governance model and making the governance structure as deliberative governance will result in sustainable risk solving strategies and plans as the transparency and accountability of both citizen and governance will be strong.

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