

Advancing Disaster Risk Reduction through Ecocentric Policy-making in the Global South: Tamil Nadu, India, in Focus

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Abstract:

No other nations of the world have been more exposed to disasters and more in need of humanitarian assistance than those in the Global South. India, which is one of the most populous and economically developed countries in the Global South is faced with recurrently flooding amongst other disasters. Coastal States like Tamil Nadu and Andhra Pradesh have, amongst others, had their share of severe disasters and resultant huge loss of lives and property. However, over the years, the government of these States have shown a strong commitment to disaster risk management but more efforts are required. Nevertheless, to fill some identifiable gaps for further sustainable development and disaster-preparedness of Tamil Nadu through ecologically centered policy-making, the paper puts forward some policy recommendations. The paper used a qualitative research methodology to examine and find some gaps in the situation of disaster risk management in Tamil Nadu, explore modern disaster risk reduction approaches within and beyond Indian, and arrive at context-based policy recommendations. Relevant secondary data (official documents) were collected and reviewed from the English website versions of the Tamil Nadu State Disaster Management Authority, some Indian dailies, and some other online sources of expert opinions. Thus, the paper recommends the creation of an all-inclusive environment of disaster risk reduction education, big data application and E-governance, incentives for partnerships and multi-stakeholder innovation, eco-friendly flood reduction programmes, and effective protection of water bodies.

Keywords: The Global South; environmental education; disaster risk reduction; flood reduction; ecocentric policy-making; Tamil Nadu; E-governance.

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I. INTRODUCTION

The term “Global South” does not refer to the countries in the southern part of the earth as it literally implies, but to nations that are considered economically disadvantaged for the mere sake of classification (Mahler, 2019). These nations include the likes of the Democratic Republic of Congo (DR Congo) and Nigeria in Africa, Iraq and Yemen in the Arab states, Afghanistan and India in Asia and the Pacific, Belarus and Ukraine in Europe, and Haiti and Brazil in Latin America and South America to mention but a few (World Population Review, 2020). These nations have been more exposed to disasters and more in need of manifold humanitarian assistance than the rest of the world.

While the phenomenon named “disaster” may sound familiar to all English users, its meaning is certainly deeper and broader than many know about it. Although it has no generally accepted definition, there are, however, some interesting approaches to its meaning. According to Perry (2007), while anyone can exercise the right to put forward their definition of disaster, whatever definition they propose will depend on their interests or purpose for which they had to make its meaning clear (Perry, 2007). Moreover, all disastrous events can be classified under natural, man-made or hybrid (a mix of natural and man-made) disasters (Mohamed Shaluf, 2007). Therefore, for this paper, a disaster can be described as a situation that is a result of a hazardous event (natural, man-made or hybrid) happening to a vulnerable population and negatively affecting them, their property, essential services, economy and environment. An example is when flooding occurs in a place where residents are not prepared to survive or manage it. This could result in the loss of lives, property, infrastructure, farms and means of livelihood. Thus, disasters hinder the economic, social and environmental development of nations (Hillier & Nightingale, 2013), both in the Global South (India and Nigeria, for example) and the Global North (for instance, Japan and the United States of America). While such events often bring some very bad news to society, the good news we can speak of today is that humanitarian and scientific efforts to manage disasters and reduce the likelihood of their occurrence have been showing some significant progress, although challenging.

It might be impossible to put an end to natural hazardous events (especially the likes of flooding), but it is now possible to prevent them from turning into a disaster that puts an end to human lives and wellbeing. Over the years, scientific and technological advancements in the spheres of humanitarian action, ecosystem services and management, and sustainable development (to mention but the essentials) have brought about the shift in focus from a traditionally reactive approach (to disaster mitigation) known as “*post-disaster response*” to a proactive one called “*pre-disaster prevention and anticipation*” (Huang et al., 2010). Hence, the emergence of the concept of *disaster risk reduction*. This new concept has been successfully applied in reducing and managing flooding, earthquakes, tsunami and other disaster risks in developed countries like (JICA-IDB, 2017). Thus, the winning approach is now to put more efforts at reducing the likelihood of a disaster occurring or, should they occur, make their ill-effect as mild as possible. Disaster risk reduction is the most proactive approach to disaster risk management as it focuses on reducing the likelihood of a hazardous event happening as well as reducing the vulnerability of a people and place to such events (Nataraj, 2019; Shi, 2019). In other words, disaster risk reduction involves deliberate and calculated actions that can be taken at the central, state and local levels of government to stop a hazardous event from bringing about a disaster (Joaquin, 2012; Shi, 2019). In this light, the remaining sections of this paper briefly examine the nature of disasters in Tamil Nadu, India, and suggest some policy recommendations for improved disaster risk reduction.

II. THE TAMIL NADU CONTEXT OF DISASTER RISK MANAGEMENT

The State of Tamil Nadu has about 15% of India’s coastline and is highly vulnerable to multiple hazards due to geo-climatic conditions, especially floods (following heavy rains), cyclonic storms, periodic droughts, landslides, sea erosion and seawater incursion, and occasionally earthquakes and tsunamis since the start of the 21st Century.

According to the Tamil Nadu State Disaster Management Authority (TNSDMA), there were massive infrastructural damages and large scale deaths during the 2004 Tsunami (which affected over 300,000 fisher folks as they lost their livelihoods, killed over 10,000 people, and damaged around 154,000 houses), 2008 Cyclone Nisha which caused 204 deaths and damages worth US\$800 million, 2015 floods that killed over 370 people and damaged crops worth US\$190 million, and 2016-2017 cyclones and droughts (Ranjit, 2020; TNSDMA, 2019). Howbeit, over the years, the government of Tamil Nadu has shown a strong commitment to disaster risk management in the region through laudable measures to strengthen disaster preparedness, response, relief and reconstruction. One of the latest on these measures is the *Tamil Nadu State Disaster Management Perspective Plan (2018-2030)*.

The Tamil Nadu State Disaster Management Perspective Plan (2018-2030) gives special preference to the priorities set out in the Government of India’s *National Disaster Management Plan* of 2016 which integrated the United Nation’s *2015-2030 Sendai Framework of Disaster Risk Reduction*, the *Sustainable Development Goals*, the *2016 Paris Agreement on Climate Change* and the Honorable Prime Ministers’ *10 Point Agenda* for disaster risk management towards climate resilience and sustainable development.

Now, the Tamil Nadu State Disaster Management Perspective Plan 2018-2030 has **fourteen goals**, which are as listed below in their original order (TNSDMA, 2018):

1. To establish comprehensive flood protection (through the application of structural and non-structural interventions to reduce risks and enhance resilience and resistance).
2. To minimize urban flood risk.
3. To enhance farmers’ resilience against climate change.
4. To revive the aquifers underground (in blocks where groundwater is currently overexploited/critical/semi-critical categories and convert into a safe category).
5. To restore and protect ecologically fragile wetland and marshlands (especially Pallikarainai and EnnoreCreek Areas and Gulf of Mannar).
6. To reclaim and restore areas affected by seawater intrusion and prevent seawater intrusion in coastal areas (especially Chennai, Thiruvallur and Cauvery Delta Districts).
7. To enhance coastal bio shields (to lessen floods and storms in coastal districts).
8. To restore and strengthen water bodies (and enhance the capacity of the water bodies through removal of silt to reduce floods and drought).
9. To promote sustainable agricultural practices in rainfed areas (especially Ramanathapuram, Dindigul, Perambalur, Sivagangai, Virudhunagar, Dharmapuri, Namakkal and Ariyalur Districts).
10. To reduce risks in disaster-prone areas (especially those prone to landslides, forest fire etc. with a special focus on The Nilgris, Coimbatore, Erode, Theni, Krishnagiri, Vellore, Villupuram, Dindigul and Thiruvallur Districts).
11. To enhance multi-stakeholder participation (especially community participation with social inclusion).
12. To strengthen non-structural measures to mitigate disaster risks.

13. To deliver climate-resilient hydraulic infrastructure for irrigation and drainage (to reduce inundation and flood damages, as well as seawater incursion with special focus on Delta Districts).
14. To build the capacity to manage Chemical Biological, Radiological and Nuclear, and other man-made disasters.

Furthermore, the Tamil Nadu State Disaster Management Perspective Plan from 2018 till 2030 has been classified into **four strategic action areas** of disaster risk reduction as follows (Mariappan, 2018):

1. **Understanding Disaster Risk:** This focuses on:
 - a) hazard risk and vulnerability assessment and mapping for all major disasters;
 - b) flood mitigation through interventions aided by mapping of flood-prone river basins with Unmanned Aerial Vehicles (UAVs), also known as drones (Marchand, 2020);
 - c) integrated Coastal Zone Management (CZM) plan for village level planning; and
 - d) big data analytics-based risk assessment.
2. **Strengthening Disaster Risk Governance:** This focuses on:
 - a) strengthening disaster response force;
 - b) modernization of fire services;
 - c) disaster response guards to provide service in all vulnerable areas;
 - d) training of first responders;
 - e) establishment of inter-departmental zone teams; and
 - f) participation of multi-stakeholders.
3. **Investing in Disaster Risk Reduction:** This focuses on:
 - a) investments towards restoring and protecting water bodies and fragile ecosystems;
 - b) prevention of seawater intrusion;
 - c) enhanced storage of water bodies; and
 - d) the making of flood-resistant cities and districts including Tiruvallur, Kancheepuram, Cuddalore, Nagapattinam, Tuticorin, Ramanathapuram and Kanyakumari.
4. **Enhancing Disaster Preparedness:** Here, the focus is on:
 - a) the use of social media, mobile technologies, satellite telephony, High Frequency (HF) sets, and distress alert transmitters in risk communication;
 - b) real-time flood forecasting and spatial decision support system for Adyar, Cooum, Kosasthaliyar rivers, Kovalam basins, and other river basins;
 - c) real-time warning about storm surge using geospatial technology;
 - d) ward level Chennai flood warning system; and the use of web-GIS based Decision Support System developed in the mobile app, TN SMART (TamilNadu System for Multi-hazard potential impact Assessment and Emergency Response Tracking), for real-time weather and disaster forecasting.

III. POLICY RECOMMENDATIONS FOR DISASTER RISK REDUCTION IN TAMIL NADU

Indeed, based on the example of disaster risk reduction measures and strategic plans put in place in Tamil Nadu, the Indian state demonstrates a commendable preparedness for disasters. Nevertheless, there is a need to support these measures with ecocentric policy-making. In other words, new policies that are focused on promoting quality environmental education, applied e-governance, incentives for partnerships and multi-stakeholder innovation, bio-shields for flood reduction, and the protection of water bodies will help close some existing gaps, address some current problems and enable a more sustainable disaster risk reduction. Based on this, the following policy solutions to problem areas are discussed:

1. Establish quality ecocentric education

Problem: The popular saying that “*My people perish for ignorance*” has high relevance in addressing disaster-related problems. A disaster is a matter of life and death, and the chance of not surviving one is increased by inadequate training on disaster resilience. The right training on environmental enlightenment and disaster preparedness needs to be strategically imparted to the citizenry from childhood to adulthood.

For example, in many Indian states, children’s learning results were reported to have been overall reduced, attendance fallen and academic performance lowered as children have been the most affected by disasters and also suffer both physical and mental trauma post-disaster (Gupta, 2020). So, when infrastructure, such as schools, in the event of a disaster, collapse or get seriously damaged, this disturbs the education process as a large number of students drop out or lose interest in education due to limited access to schools. Yet, the

school has been the main platform to impart skills to children who will have to survive disasters and get to become future leaders. Therefore, it is needful to establish an environment where the study of disaster resilience is systematically integrated into different spheres of society such that the ecocentric learning process can hardly be disrupted by a disaster.

Policy Solution: A multi-sectoral approach could be used to create an all-inclusive environment of continuous acquisition of quality skills for disaster risk reduction and resilience from childhood to adulthood. In this light, it is suggested that the government could:

a) Create **emergency management courses** typically covering the time before, during and immediately after different kinds of disaster with the long term in perspective. An approach could be to set up a “Curriculum Review Committee,” comprising expert educators and experienced practitioners in disaster risk reduction and resilience, who would develop a plan for how best to integrate their knowledge as compulsory subjects or courses in the curricula for primary, secondary and tertiary education at schools. This would involve working in collaboration with the various Education Departments in the state to hopefully have this achieved. This is in line with many of the Goals of the Tamil Nadu State Disaster Management Perspective Plan, especially *Goals 2, 3, 9, 10, 11, 12, and 14*.

b) Also, given the prevalence of informal settlements in moderate to extreme earthquake and flood-prone places, policymakers could **influence more funding by government and businesses in the furtherance of disaster prevention engineering research**, especially on earthquakes and flood risks. In this regard, the **Build Back Better** principles could also be included in university and college courses. Besides, the National Disaster Management Act (NDMA) of 2005 has made it compulsory for cities to develop disaster management plans. Considering the Chennai Smart City Mission, there is a need for a proper examination of all buildings and structures in the light of ensuring that those in high-risk disaster areas are made disaster resilient.

c) Enforce **compliance with building codes** for disaster risk reduction in at-risk areas. These building codes should be publicized and made available to all registered builders. Without proper education and practical application of these skills, as well as willing obedience to set standards, risk reduction and resilience policies will be less effective.

d) Create incentives to **attract the establishment of grassroot nongovernmental organizations (NGOs) whose mission would be to render free professional emergency response training and certification** to volunteers and first responders. Their modes of training could be a mix of offline (in-person) and online methods – this would ensure that physical infrastructural damages due to a disaster do not interrupt the learning process directly. They should provide periodic training and conduct mock drills for their trainees. An example of this kind of incentives could be to make the registration of such NGOs cheaper (free or with tax exemption) and faster bureaucratically.

2. Apply advanced use of big data and hybrid technology (e-governance)

Problem: Decision-making is a process that is driven by the amount and quality of information available to decision-makers. Slow decision-making, which is terrible for live-saving situations, is often caused by a delay in getting the needed information. Therefore, proactive disaster management at the State level calls for the need to collect and appropriately use big data to save lives: continuously gathering information on community surveillance, weather situation and (should a disaster occur) quickly linking victims with emergency response service providers.

Policy Solution: Policymakers could **use the potential of big data and advanced information technology tools** to provide faster and better disaster management and disaster risk reduction. Some priority-aspects would be to allow better data sharing, where possible, transport patterns and readings from building and infrastructure sensors, as well as energy flows. In respect of this, policymakers could:

a) Ensure the adoption and application of systematic tools, such as **urban software systems designed against threats** like flooding, earthquake, storms etc, already developed by local and international agencies – tools designed to enhance resilience, improve planning, infrastructure design and management.

b) Push for the establishment of a **‘Real Time Governance Centre,’** devoted to the application and management of e-governance and advanced information technology for disaster risk reduction and disaster management in Tamil Nadu – A center for real-time surveillance of environmental situation and redress of grievances. **A good example of how this works is in Andhra Pradesh** where Chief Minister Chandrababu Naidu inaugurated a centre to handle all crucial events and natural disasters on a real-time basis. It also serves as a platform for the redress of reports on internal grievance (collected through various apps and portals), as well as surveillance and communication unit. The centre monitors data from multiple surveillance systems (such as strategically positioned CCTVs) statewide.

c) In further strengthening the “Real Time Governance Centre” project, integrate the existing **TN**

SMARTmobile application for disaster alerts and emergency response into the real-time governance system. A

messaging or free SMS alert system could be added so that users of the app could send reports and forward grievances to the centre through it.

d) Push for the application of artificial intelligence for better surveillance of reserve forest areas and closer monitoring of fire-prone areas. For example, **in Italy, remote control technologies have been introduced by the Regional Irrigation and Forest Activities Agency (ARIF) of Puglia** to complement the work of volunteers and workers and retain control over forest fires (FLIR, 2019). For this, a systems integrator with extensive expertise in environmental protection was chosen as the perfect partner for implementing a network of thermal cameras for early fire sensing. The solution involved FLIR-thermal imaging security cameras and a software-based SR7 core program that has already worked in other foreign ventures. The camera's video is analyzed by intelligent software which detects fires without apparent smoke or flames in the earliest stages. The camera data is sent to an operating center where the program processes data continuously, tracks the territory (mapped using a GIS device in the center's computers) automatically and alerts the workers about any irregularities (FLIR, 2019). This technology can be likened to a hybrid mix of closed-circuit television (CCTV) and unmanned aerial vehicles (drones).

3. Create incentives for partnerships and multi-stakeholder innovation

Problem: The task of preventing and managing disasters like flooding, earthquakes and storms in Tamil Nadu is cumbersome and calls for the engagement of all stakeholders in its realization. While the lion's share of this responsibility theoretically lies with the government, it practically affects everyone, and should therefore be made to officially involve as many interested groups as possible. In addition, it is known that private sector actors are more innovative in solving problems than their public sector counterparts. Involving the private sector in the business of disaster risk reduction will hardly be successful if they are not allowed to be innovative in how they collaborate or partner with public agencies in this regard. Therefore, it is necessary to enable as much creativity as possible in disaster risk reduction and disaster management for longer-term risk reduction and disaster readiness.

Policy Solution: Firstly, through incentives, **a multiple partnership approach** could be used to create a competitive but still supportive environment for collaboration in combating natural and man-made disasters. Secondly, in line with **Goal 11**, policymakers could eliminate legal and other regulatory hurdles that discourage innovative investment or, worse, promote continued low-resilience investment. **Businesses, community-based NGOs and households or individuals with innovative ideas on disaster risk reduction and disaster management should be encouraged to invest in their projects.** Therefore, it is suggested that policymakers could:

a) Create **incentives to encourage private-private partnerships** in pursuance of the 14 Goals in the Tamil Nadu State Disaster Management Perspective plan. An example could be to urge the Tamil Nadu legislative assembly to enact a law on tax deduction (lower tax) for all for-profit companies that incorporate social responsibility partnerships (both local and international) and can evidence willingness and readiness for a longer-term commitment to supporting the government in achieving any or some of the 14 Goals in the Tamil Nadu State Disaster Management Perspective Plan. For example, in this respect, insurance companies may **offer attractive discounts** to other businesses and households who reinforce their structures, or offer products that could aid the rebuilding of disaster-damaged buildings to fortified standards.

b) Create **incentives to encourage public-private partnerships** for disaster risk reduction and disaster management. This could be in the form of **capital grants** or any other form of financial support from the government to private organizations with expertise in flooding or disaster risk reduction.

c) Ensure the **formulation and implementation of policies that enable companies to go innovative and faster** and transform disaster resilience into a truly competitive business. And that public regulations (including construction codes, environmental architecture, laws on the usage of property, tax policy, etc) are used to create infrastructure and mitigate disaster risk.

d) **Stabilize regulations overtime** to secure long-term investment (especially in areas such as infrastructure) and ensure effective compliance with set standards.

e) **Encourage investment in resilient housing** and new, more disaster-resilient technologies. For example, **through tax breaks** or/and faster approval processes, as well as enforcing minimum standards in construction, land use etc.

f) Ensure the **removal of barriers to expanding insurance** against disaster risk, particularly in vulnerable and low-income communities, and create micro and index-based insurance.

g) Encourage businesses (especially, small and medium-sized enterprises, SMEs) to readily **share knowledge and skills with public actors**, as well as include SMEs in new pro-resilience incentives.

h) Help facilitate the **fast-tracking of loans (and microfinancing)** for building improvements or availability of **lower interest rates on projects** such as flood-resistant constructions, earthquake-resistant buildings, shatter-resistant windows in hurricane areas, more secure roofs or the use of fireproof materials.

i) **Use tourism** to promote the business of disaster resilience. For example, a value proposition could be to encourage businesses engaged in tourism to **build disaster-resistant sites and resorts that can attract tourists** and visitors to them (such as, monsoon-resistant hotels and restaurants, resilient conference centres, beaches, museums, zoos etc.). Hence, encourage businesses to do more to market the advantages of resilience to consumers and people.

j) Legislatively support **household capacity to build disaster-resilient homes**. This could be achieved through a proposal of a faster or/and cheaper plan approval process for intending builders **who have stormproof or hurricane-resistant building plans** or flood-resistant home reconstruction plans that meet legal building codes.

4. Introduce ecofriendly flood-reduction programmes

Problem: Sea shorelines without flood prevention structures make flood-related natural disasters very severe. However, such a disaster can be avoided or reduced through flood-reduction initiatives. One such initiative is the use of coastal bio-shields as natural prevention structures.

Policy Solution: Policymakers could create **incentives for the speedy development of ecofriendly bio-shields** along coastal lines. This could help protect coastal areas of Tamil Nadu against potential sea-level rise, erosion, coastal storms, cyclones, and tsunamis. The setting of coastal bio-shields serves as ecologically friendly structures for reducing flooding (Niles, 2018). Vegetational bio-shields (or coastal forests) help absorb energy from wind, wave and tide actions to protect the coastal environment (Rex et al., 2009). They also allow people to climb them and get out of waves, prevent debris and rocks from moving inland, reduce damage to infrastructure and buildings by reducing the energy of the wave. For example, when salt-tolerant plants along coastal lines grow higher than most tides, they stabilize sand transported by wind. This approach is cheaper and more sustainable for disaster mitigation in the longer term.

5. Effective protection of water bodies

Problem: Several lakes in Tamil Nadu have suffered encroachments due to increasing industrialization, urbanization, and a market-driven economy (Mariappan, 2020). With rampant encroachment of lakes, canals, tanks and other water bodies in the State despite many legal provisions in the protection of water bodies, it will be difficult to put an end to recurrent droughts if the situation is allowed to remain like this.

Policy Solution: Policymakers could **enact and enforce stricter laws against water bodies encroachments**, thereby addressing the ineffectiveness of existing laws. For instance, the government could criminalize unlawfulencroachments and impose higher penalties or a prison sentence upon culprits.

IV. CONCLUSION

Coastal States, such as Tamil Nadu, are challenged by disasters in India and other countries across the globe. The government of Tamil Nadu has been dedicated over the years to managing disasters risks and damages. A praiseworthy measure is the 2018-2030 Tamil Nadu State Disaster Management Perspective Plan. Still, in addition to this, the paper suggests the creation of an all-inclusive environment of disaster risk reduction education, big data technology application and E-governance, incentives for partnerships and multi-stakeholder innovation, eco-friendly flood reduction programmes, and a more effective protection of water bodies. It is hoped that if the suggested measures are put in place in addition to the existing examples of Tamil Nadu and Andhra Pradesh, Global South countries would be able to demonstrate more disaster preparedness and apply a more sustainable approach to disaster mitigation given adequate public-private funding and partnership.

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