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# Discourse of Flood Management Approaches and Policies in Bangladesh: Mapping the Changes, Drivers, and Actors

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**Abstract:** The fundamental processes of policy shifts emphasize how policy problems emerge and how policy decisions are made to overcome previous shortcomings. In Bangladesh, flood management policies may also have been driven by policy failures and flood-disaster events. In this context, we examined how policy shifts occurred in the country from 1947 to 2019 in areas of water management and flood prevention, control, and risk mitigation. To understand the nature of these policy shifts, we examined the evolutionary processes of flood management policies, the associated drivers, and the roles of key actors. Our findings reveal that policy transitions were influenced primarily by the predominance of the structural intervention paradigm and by catastrophic flood events. Such transitions were nonlinear due to multiple interest groups who functioned as contributors to, as well as barriers against, flood prevention policies. Policy debates over environmental concerns helped bring about a shift from a primary focus on structural intervention to a mixed approach incorporating various nonstructural interventions. Furthermore, our results suggest that the shifts in flood management policies have resulted in some degree of reliance on a “people-centered” approach rather than solely an “engineering coalition”, which emphasizes the pivotal role of community members in decision making and the implementation of flood policies and programs.

**Keywords:** flood management; water management; policy shift; policy change; drivers; policy actors

## 1. Introduction

Recently, compared to other natural disaster shocks, extreme weather-triggered flood events have caused more severe damage across the globe. A global dataset from the Centre for Research on the Epidemiology of Disasters and the United Nations Office for Disaster Risk Reduction confirms that floods accounted for 43.4% of all catastrophic events in 2018 [1]. In South Asia, Bangladesh has experienced severe floods periodically due to nonlinear geomorphological and hydro-meteorological trends, unplanned land-use practices including urban sprawl, deforestation and, significant population growth. Frequent large floods, thus, make Bangladesh one of the most flood-prone countries in the world.

Most of the area of Bangladesh consists of river floodplains and deltaic plains that provide a unique hydrological regime to the country. Only 7% of the very large catchment areas of the three transboundary river systems (Ganges, Brahmaputra, and Meghna) lie within the territory of Bangladesh [2]. Annually, more than 30% of the country’s total land, inscribed with more than 350 perennial rivers, is deluged by floodwater [3]. During the last two decades, the country experienced four catastrophic floods, in 2004, 2007, 2012 [4], and 2017 [5]. The 2017 floods were very unusual,

causing 145 fatalities and damaging more than 100,000 houses. The 2017 flash flood affected six districts of the northeastern part of the country, and nearly 33% of the country was under water [5]. From March to April of 2017, the monsoon river flood devastated the region, and in August of the same year another flood affected 32 districts [6]. Economic losses from these two spells of catastrophic floods were estimated to be about 150.1 billion BDT (Bangladeshi taka) (1.83 billion US\$).

Generally, the following four types of floods occur in the country: (i) flash floods, (ii) rain-fed floods, (iii) river floods (most common), and (iv) storm floods [7]. The river floods are caused by the major river discharges that carry a large volume of water entering from India and the in-country precipitation. The rise of water in the major rivers begins with the monsoon onset in June, bringing flood water down from the upstream basin areas. Major rivers peak in different months during the monsoon as a result of the onset dates and the precipitation characteristics [7]. The flood risk in the central region rises considerably if floods arrive simultaneously in the Ganges and Brahmaputra Rivers. Mirza [8] examined the occurrences of floods in some major rivers and their tributaries to determine the months with the greatest potential for generating simultaneous floods. He inferred that the peaks in the Brahmaputra Basin occur in July and August and the Ganges Basin in August and September. In the Brahmaputra River, maximum discharge occurs 35% of the time, and for the Ganges River it occurs 45% of the time in August. This indicates a likelihood of simultaneous floods in the Ganges and Brahmaputra Rivers in August.

Since the 1950s, the territory of Bangladesh has confronted the challenges of river and flash floods and formulated various policy and program interventions, ranging from the physical control of floodwater in early decades to public awareness building more recently. Because Bangladesh is one of the largest deltas and extensive floodplains in the world, floods are not always considered “negative” phenomena. Rather, because annual inundation replenishes the ecosystem, soil and wetlands, as well as provides services to people for their livelihoods, normal floods are seen as positive and socially desired events. The overall water and flood management policy objectives in Bangladesh have, therefore, been concentrated on the management of water by treating it simultaneously as a resource and a hazard (i.e., flood).

Most Bangladesh studies have been concerned with hazard (e.g., flood) or resource (e.g., water) management policies [9–11], treating them independently. As a combined analysis of the flood and water management policies of Bangladesh has so far been absent, our study, using an integrative lens, makes a useful contribution by providing a unique understanding of policy dynamics that encompass evolving discourses of resources and risk issues. The shifts and changes in such policies and programs are of interest to hydrologists, water resource specialists, flood management regulators, and policymakers, as well as the local communities who are frequent victims of floods.

Numerous studies [3,12–15] have affirmed that policy transition and shifting processes are influenced by multiple factors, such as political considerations, donor interests, knowledgeable stakeholders’ interests, institutional and individual learning from flood-related crises, and pressure from civil society and the public. A successive shifting of flood management policies can take place by following fluctuating, nonlinear courses, including taking an incremental path or catalyzed by certain events or pressures [9]. Knowing the drivers of these dynamic processes can assist policy and decision makers to formulate successful future goals for flood risk reduction and ensure sustainable economic and social development courses.

In this context, the specific objectives of our study are threefold. First, to examine the evolutionary discourse of flood prevention and control policies in Bangladesh, acknowledging that sustained assessments and incremental learning, as well as event-driven institutional learning, and failures in policy implementation can contribute to policy shifts and major changes [15,16]. Secondly, to map and analyze the role of drivers and key actors in policy shifts and changes [15,17]. Finally, to highlight the implications of flood management policy debates and the implementation of reshaped interventions.

## 2. Theoretical Underpinnings of Floods and Water Management Policy: Progressions and Shifts

Understanding theoretical insights about the policy shifts and major changes is imperative as they can explain some of the most complex facets of policy dynamics [18]. In the context of flooding as an extreme hydrological condition and the evolution of management policies formulated to address the prevailing and emerging problems, one needs to critically assess the premises and features of prevailing dominant theories concerning policy evolution processes. Event-driven disaster management policy change can be defined as follows: “if there is prima facie evidence of policy changes that are reasonably linked to the causal factors that connected the event under consideration to its harms, and if addressing these factors would be likely to mitigate the problem” [19].

Hazard or disaster management policy change broadly falls under the following two categories: (i) incremental change, and (ii) radical change, which can sometimes also be regarded as a “paradigm shift.” In the context of incremental policy change, Charles Jones [20] advocated for a decision-making approach, which postulates that policymakers respond to political and emerging societal pressures rather than making significant changes in existing policies; a dearth of appropriate knowledge and failing to engage in consecutive comparisons are also contributing factors in making such minor changes. Indeed, “incrementalism” denotes steadiness in existing policy processes [20]. Ripley and Franklin [21] argued that the trend in incremental change is to rationalize the policy change as resulting from unexpected behaviors of decision makers; the avoidance of policy conflict, cooperation with political masters rather than decision makers putting pressure on political masters, and the ratification of the decisions all impede sudden change in policy processes. Thus, substantial change is only possible when a catastrophic shock affects the decisions of policy architects and captures the attention of the media and the upper levels of government officials.

Developed by John Kingdon [22], the policy steams approach offers alternative explanations of the evolution of policy courses. This approach explicates the process of policy issues materializing, how they attract the attention of policy reformers, the process of framing ideas in the policy setting, and the timing of ideas [23]. The fundamental basis of this model is that policy development happens as a gradual process through learning and adaptation rather than emphasizing its stability. According to Kingdon [22], the formation and adaptation of policies through setting agendas are predominately influenced by three different streams, i.e., problems, policies and politics. In numerous countries, water resource development policies have followed such a gradual learning and adaptation-based evolutionary path. For example, Henstra and McBean [24] explained that the Canadian water and flood management policies were mostly “reactive” initiatives against agricultural needs and catastrophic losses due to abnormal inundation. Similarly, the discourse of flood disaster and water management policies in Bangladesh has undergone sequential modifications based on experiential learning by the concerned institutions [13]. Such adaptations to changing scenarios have resulted in a shift from post-event responses to a preparedness and mitigation approach.

Explanations of the formation process of radical policy change emphasize the punctuated equilibrium model [25], which suggests that the evolving process is influenced dramatically by the pressure of political leaders, policy reformers, masses of people, and the media. These groups of actors raise new voices based on former notions and promote different institutional values for rapid policy formation. This model directs attention to understanding the drivers that enable both incremental and abrupt change in certain policies by examining relevant policy-related issues over time; for both types of change, episodic events such as floods are considered catalytic drivers. Johnson et al. [26] argued that flood shocks promote “punctuation” if a flood affects the entire nation. A “window of opportunity” is also created by this punctuation that enables a wide number of actors to highlight numerous contextual factors and issues, as floods open possibilities to integrate a range of distinct ideas into the policy transition process [27].

Policy evolution studies also apply the advocacy coalition framework, pioneered by Paul Sabatier [28], which is grounded on four subsystems which include: time frameworks, policy subsystems, intergovernmental dimensions, and belief systems for policy studies. Sabatier [28]

affirmed that two forces, advocacy coalitions and external shocks, are the key drivers to bringing change in these subsystems, and he argued that competing coalitions transform their values and beliefs into the policy cores and government programs. Another driver, external perturbation, alters the socioeconomic situation and the subsystem of the governing process and coalition. Thus, the new policy space demands political attention and creates options for introducing innovative ideas. As a dynamic process, this model establishes a foundation of knowledge and ideas, which helps in bargaining of issues for coalitions and for setting agendas [29]. Over the period of policy formulation, the negotiation process transforms coalitions and, occasionally, it is also directed by collective learning [30].

David Truman [31], in developing the agenda-building approach, argued that in the process of rapid policy deliberations, due to public interest and attention, a disastrous event receives higher priority on the government's policy agenda. He explained that the policy formulation process is not only concerned with the feasibility of an issue, mass consciousness, but sometimes also with the overstated consequences, especially of disastrous events, that are deemed to require immediate measures to tackle the exacerbated condition.

However, for the Ganges Delta and floodplains in Bangladesh, the flood management policy cannot be separated from water (i.e., resources) management policies. Consideration of floods as a hazard only does not provide a comprehensive perspective, as management of one resource sector is inextricably interlinked with the management of other resources. In this regard, Rayner and Howlett [32] identified five policy change processes relevant in our discussion, namely, layering (incorporating new policy goals and instruments), drift (change only in policy goals), conversion (change only in policy instruments), displacement (change brought about by actors advocating previously subordinated logic that gains a stronger hold in the policy regime), and exhaustion (radical policy change due to incompatibility between policy goals and interventions).

For the purpose of examining the distinctive nature of the flood policy change and based on the above critical thoughts and arguments, we formulated an integrated framework applying the diverse notions of policy change (Figure 1). In its core, the framework instigates ideas about the political processes and decision-making approaches, drawn from Truman's agenda-building approach [31], the decision-making approach by Jones [20], and the punctuated equilibrium model by Baumgartner and Jones [25]. The framework depicts that a faction of political leaders, policymakers, and interest groups (e.g., donors and engineers) influence the policy decision-making process (Figure 1). Often, rapid changes in the policy process result in new arrangements of power as well as of the decision-making system.

To understand the changing policy approaches and shifts in water resource and flood disaster management strategies in Bangladesh, attention must be paid to both gradual and incremental change and to radical, event-triggered processes and their associated drivers, along with their interactions and outcomes. Some have referred to major floods in Bangladesh as "focusing events" [29] and "episodic events" [18] because such flood shocks to biophysical systems and the socioeconomic environment have enabled the generation of distinctive ideas and the creation of newer values and policy issues by different actors. In Bangladesh's territory, these features have been recognized since the second half of the 20th century.

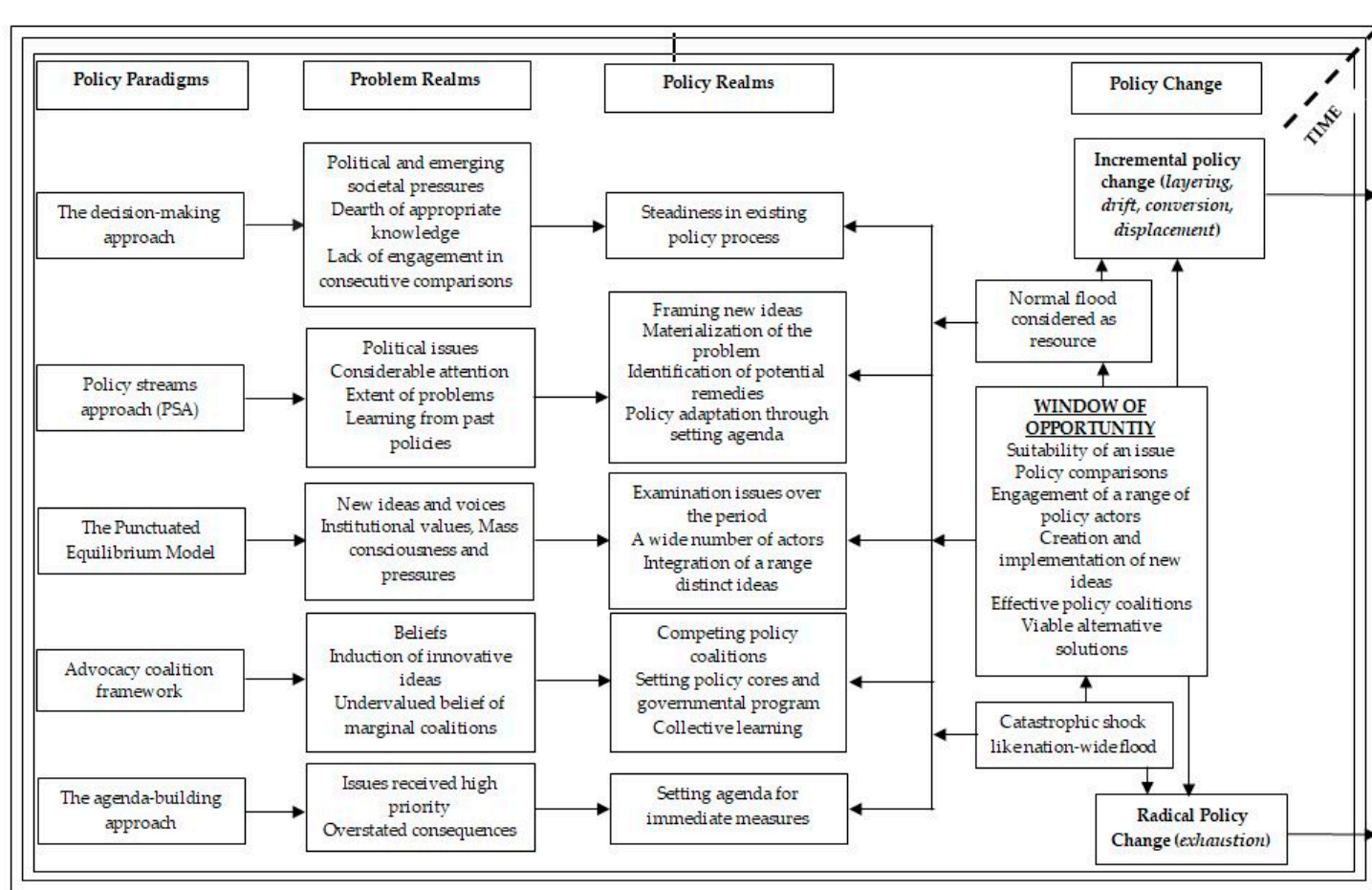


Figure 1. A conceptual framework of policy process and change. Source: After Johnson et al. model [29].

### 3. Methods

Studying policy transformation in the context of flood hazards requires familiarity with and understanding of wide-ranging linkages between theoretical insights and policy research. For our inquiry, we employed the content analysis technique, following a qualitative research design, as advocated by Sarantakos [33], to map the changes of flood management policies, drivers, and the level of participation by the actors in policy debates. Our approach to the content analysis relied heavily on document reviews, aiming at identifying the thematic and noticeable issues of flood prevention and management policies and their changes over time. Document reviews, depending on the subject matter of the study, examined policy documents, laws related to disaster management, journal articles, and newspaper articles. An in-depth analysis of these documents was carried out with consideration of the following three objectives: (i) to evaluate the historical changes in flood control and water management policies in Bangladesh, (ii) to identify and analyze the key drivers of policy changes that shifted flood management approaches, and (iii) to examine the role of actors in flood policy discourse and debates. To attain these objectives, the selection criteria for pertinent documents concentrated on three key thematic areas which included: (i) flood and water management issues, (ii) flood policy processes, and (iii) policy debates and implications.

To investigate the salient features of the selected documents systematically, we evaluated the texts that were of theoretical significance and relevance to the subject matter of the study. For this, Birkland's [19] model of policy change was applied to extract major thematic areas of the texts. To represent a clear picture of flood policy progression in Bangladesh, texts were analyzed in terms of the following five key policy domain-related questions: (i) did flood hazards receive noticeable attention? (ii) did flood events receive priority in agenda setting? (iii) how did multiple policy actors bring new ideas and integrate these into flood prevention and water management policies? (iv) what type of changes occurred in flood policies (i.e., incremental or radical)? and (v) what were the implications of flood policy implementation? The content analysis attempted to delineate latent meanings of the texts and to map the theoretical relationships between flood policy shifts and changes and their drivers.

To achieve a better understanding of policy successes and failures, we further evaluated the role of policy debates in promulgating new policy. Documents were categorized by identifying the relevant issues in the debates, and policy debates were examined in the context of the nature of debates, their causes, and the actors engaged in the debates.

### 4. Evolution and Change in Flood Control and Prevention, and Water Management Policies in Bangladesh: A Historical Account

Flood control and prevention policies have been shifting continuously over the last 70 years in the territory occupied by present-day Bangladesh, ranging from hard engineering solutions to various soft solutions. Our analysis reveals that the trend in this policy shifting can best be captured in terms of three distinct phases as follows: (i) the structural phase (1947 to 1987), (ii) the structural and nonstructural mixed phase (1987 to 1995), and (iii) the post Flood Action Plan (FAP) phase (1995 to present). These phases were likely influenced by various flood-triggered issues, social-ecological factors, policymakers' interests, and foreign interests.

#### 4.1. Structural Phase (1947 to 1987): Large- and Small-scale Engineering Schemes

In the early 1950s there was no or little mention in government documents of the flood problem and the need for flood protection [34,35]. The development of modern flood management policies emerged following two consecutive devastating floods in East Pakistan (present-day Bangladesh) in 1954 and 1955. These two catastrophic floods drew attention from the international community, and several commissions were sponsored to study the problem and find solutions.

In accordance with the advice of the Krug Mission Report, which was a technical report of the United Nations Development Program (UNDP), the East Pakistan Water and Power Development Authority was set up in 1959, which is now known as the Bangladesh Water Development Board.

Subsequently, based on the technical report, a 25 year Master Plan was developed in 1964 with the support of the International Engineering Company, USA, to protect riverbanks and mitigate floods through large-scale engineering measures [9,35]. This master plan consisted of 91 massive construction projects, funded by donor agencies [3]. The aim of these large-scale construction projects was to build embankments along the major riverbanks, make channel improvements, conduct river dredging and training, and construct bypasses or flood diversions. For example, under this initiative a large-scale project named the Brahmaputra Right Bank Flood Protection Embankment was successfully completed in 1968 [3].

After the independence of Bangladesh in 1971, there was a policy shift in the flood control approach, which stemmed chiefly from experiential learning [3]. After the Liberation War, the country faced widespread challenges to feed its more than 75 million people. An additional layer, therefore, was included in the existing policy domain, i.e., management of water resources was added to flood control for protecting livelihood and food security (Table 1).

**Table 1.** Nature and pattern of changes over time in flood and water management policies in Bangladesh.

Policy Regimes	Flood Events	Institutional Initiatives	Plans/Policies/Acts	Key Policy Intervention	Policy Debate	Nature of Policy Change
Structural phase (1947 to 1987): Large-scale and small-scale engineering schemes	1954 and 1955	East Pakistan Water and Power Development Authority, 1959	The “Krug Mission” report and technical report of UNDP Master Plan 1964	Protection of riverbank and flood through large scale constructions	None	Baseline policy
		A Master Plan Organization 1983	‘The Land and Water Resources Sector’ (WB)	Drafting a National Water Plan (NWP)	None	Layering
		National Water Resources Council (NWRC) 1983	None	Inter-ministerial coordination of water-related policies and responding to regional challenges	None	Conversion
Structural and nonstructural phase (1987–1995): Flood Action Plan (FAP) regime	1987 and 1988	Flood Plan Coordination Organization (FPCO)	The Flood Action Plan (FAP) 1989; National Water Policy, 1991	Permanent solutions to floods through structural mechanisms Emphasis on river training, floodproofing, and warning	FAP Debate (Technocratic approach)	Layering-exhaustion
		Water Resources Planning Organization (WARPO) 1992;	The Bangladesh water and flood management strategy (BWFMS) 1996	The involvement of all stakeholders in the implementation phases of projects		
		Disaster Management Bureau in 1993 Ministry of Disaster Management and Relief 1994				



Table 1. Cont.

Policy Regimes	Flood Events	Institutional Initiatives	Plans/Policies/Acts	Key Policy Intervention	Policy Debate	Nature of Policy Change
Post-FAP phase (1995–present)	1998, 2007		The National Water Policy (NWP), 2000; Bangladesh Water Act ratified, 2013	Integration of structural and nonstructural solutions for the protection of lives, properties, and infrastructure from floods	Inter-ministerial Debate on flood policies	Multiple layering
			The Standing Order on Disasters (SoD) 1997 revised in 2010	Ensuring the duties and responsibilities of all entities before, during, and aftermath of a disaster		
			The National Water Plan (NWP) 2000	Providing guidelines to implement water and flood management functionalities at the regional and national level		
		Ministry of Disaster Management and Relief (MoDMR) 2012	The National Plan for Disaster Management (NPDM) 2010–2015	Reducing the risk of the vulnerable population from the adverse impacts of unexpected disasters		
			The Disaster Management Act of 2012	Guiding institutional reformation and ensuring the duties, responsibilities, activities of all stakeholders under obligation		
			The Bangladesh Water Act of 2013	Providing provisions for the management of water resources and protection from floods using an integrated model		
			The National Plan for Disaster Management 2016–2020	Sustainable human development through enhancing resilience mechanisms		

During the post-Liberation War period, large-scale structural management mechanisms were questioned by critics, especially regarding the costs and benefits of these projects [3]. A World Bank study on the Land and Water Resources Sector [36] recommended shifting from large-scale projects to small-scale and low-cost projects for flood control and irrigation [9,37,38]. This shift resulted in the government-subsidized supply of shallow tube-wells in the early 1980s and low lift pumps in large cultivable areas to pump out floodwater, along with some credit supplies for agricultural production. Indeed, the overall goal of flood control processes aimed at achieving self-sufficiency in food production and focused on agricultural extension programs [3].

The state acknowledged the importance of a National Water Plan, and an institutional reformation was carried out for the creation of a Master Plan Organization in 1983, aiming to draft a National Water Plan for the country. The same year, a National Water Resources Council was established for inter-ministerial coordination of water-related policies and to respond to regional challenges concerning water resources and flood management [35].

#### 4.2. Structural and Nonstructural Phase (1987 to 1995): Flood Action Plan (FAP) Regime

A significant policy transformation occurred in the late 1980s. After catastrophic floods in 1987 and 1988, which incurred costs of more than two billion US\$, flood prevention policies emerged as a common agenda in national and international dialogues [3,37]. Some quarters cautioned, based on learning from these horrific floods, that the absence of an “ecologically sustainable water resource policy guideline” [3] was in part responsible for increasing flood-disaster vulnerabilities and casualties in the country. We find this shift to be layering exhaustion, where an opposing paradigm (i.e., human dimension of flood and water management) was layered into the existing policy paradigm (i.e., structural mitigation measures) (Table 1).

As a result, in 1989, the Flood Action Plan (FAP), characterized by an integrated approach, was adopted by the government in collaboration with international agencies to achieve a permanent solution to floods, primarily through a structural approach. Initially, the FAP consisted of 26 components intended to constitute an integrated system of flood control and drainage activities. The FAP project components concentrated on river training and flood control, flood proofing, flood forecasting, and early warning. In the early stages, the FAP components related to nonstructural measures, such as flood proofing and flood warning, received less attention from the stakeholders [38].

A separate body, the Flood Plan Coordination Organization, was created to monitor and to coordinate the functionalities of the FAP [39]. For participatory management of the structural projects, the organization formulated the “Guidelines for People’s Participation in Water Development Projects” [40]. The guidelines included the requirement of involving all stakeholders in project implementation phases. In 1991, the FAP initiatives also included undertaking a formal policy formulation process leading to the National Water Policy for the management of water resources in Bangladesh. Near the end of the FAP regime, several studies were undertaken under FAP, which suggested promulgating the Bangladesh Water and Flood Management Strategy 1996, for coordinating, constructing, and maintaining water-related projects, and recommended introducing a National Water Management Plan Phase II.

Numerous studies [3,10,11,37] have revealed that engineering solutions generally have failed to achieve their goals due to a lack of maintenance, faulty design, and the paucity of local participation. A range of criticisms highlighted that the FAP did not adequately recognize other cross-cutting sectors and potential impacts of structural measures on the environment and economy [9]. The primary pitfall of the FAP immediately appeared to be that the implementation processes did not pay necessary attention to public views in the decision-making process.

The failure to achieve flood control and prevention and the lack of recognition of public voices triggered significant policy debates. Several studies [3,11,37] have underscored that the technocratic approach to flood management, aimed to solve an immediate problem, does not provide due consideration to its long-term impacts on the environment and livelihoods, and so deserves critical

reviews. Furthermore, it has been alleged that this technocratic-structural notion failed in ameliorating flood problems due to overlooking extreme precipitation, river discharges, and ecological factors in an integrated manner, particularly in the design and planning of flood prevention measures [11]. During this policy debate, two factions were persistent; the so-called “embankers” and the “proofers” played significant roles in policy design and implementation. The proponents of physical intervention through embankment construction continued to dominate flood management debates and programs in Bangladesh. The consortium formed under the leadership of the UNDP was the primary proponent of controlling water and flood across the major river basins, whereas the Eastern Water Study by a team led by USA-based organizations, as well as the local NGOs, advocated primarily for floodproofing as a measure of risk reduction. However, the supporters of floodproofing were important in mobilizing international stakeholders [38]. Eventually, a policy coalition crystallized among the bureaucratic elites, including “proofers” and “embankers”, for the planning of flood defense interventions [38].

Donor agencies who also played major roles in shaping flood and water management policies in Bangladesh throughout the 1980s and 1990s became divided on these issues. In the early 1990s, a number of plans were developed by donor agencies for flood prevention (to ensure zero annual inundation) in Bangladesh’s major floodplains. Two schools of thought emerged from the donor agencies. The plan for building levees along the riversides and river training was strongly supported by the French and the UNDP; conversely, the flood mitigation (risk and impact) plan was advocated by the USA. The latter approach was subsequently also supported by a Chinese plan [38].

These critical debates and widespread controversies prevailed after the introduction of the FAP [11,41]. The FAP regime faced many criticisms from civil society, environmentalists, lawyers, journalists, and nongovernment organizations, who raised questions about the appropriateness of the dominance of engineering solutions to floodplain and river management [11,41]. The debate about the FAP highlighted concerns about technical viability, economic benefits, inadequate returns from agricultural sectors, and negative impacts on the livelihood of destitute populations. A particular question was raised about its legitimacy in the policy decision-making process [11].

To follow up, in 1995 a prominent research organization, the Bangladesh Centre for Advanced Studies, along with the Coalition of Environmental NGOs and the Association of Development Agencies in Bangladesh organized a “people’s conference on FAP” in Dhaka [42]. The participants from different stakeholders, including international donor agencies, journalists, policymakers, and flood-affected people, gathered and produced immense pressure upon the Government of Bangladesh [11,42]. The discourse pushed the government to terminate the FAP activities in 1995 and to shift its flood management approach towards more effective public participation. Subsequent projects on disaster management, flood proofing, and livelihood development projects were, thus, ensured some degree of stakeholder and larger public participation. These emerging participatory processes attempted to address some of the concerns about training needs, livelihood options, and alternative adaptation mechanisms, instead of a structural defense approach to flood hazards management.

#### *4.3. Post-FAP Phase (1995 to Present): Towards an Integrated and Participatory Flood and Water Management Policy*

The transformation of the water and flood policy was accelerated by incremental processes and catalytic events [26], as weather-triggered events began to affect them significantly. Flood policies were no longer limited to the defensive or “fighting” approach. An inclination towards integrated water resources management was noticed during the FAP implementation stages and was reflected in the promulgation of the 1999 National Water Policy. This policy was clearly a “window” for economic growth, poverty eradication, and health and well-being through the protection of the natural environment [37,43].

A critical paradigm shift in the policy framework was observed as the argument of the need for the integration of structural and nonstructural solutions to protect lives, property, and infrastructure from floods in an equitable way succeeded in receiving some attention in policy domains [44]. Under the new approach, it was recognized that the water management system needed a coordinated mechanism

of all affiliated agencies and the engagement of community-based organizations [39]. Recognizing the sectoral importance of the water sector development, national authorities finalized the 2000 National Water Plan. This plan and policy framework provided guidelines for the regional and national level organizations to execute water and flood management activities in a coordinated manner. Subsequently, in 2013 the Bangladesh Water Act was ratified by the representatives of the Parliament to ensure effective maintenance of flood control and prevention embankments and structures. The aim of this Act was to make provisions for the management of water resources and protection from floods using an integration model.

Following this call for intersectoral and interorganizational coordination, conflicts were apparent among different ministries. For example, the Ministry of Water Resources has solely been responsible for floodwater management through structural and nonstructural measures, while the Ministry of Disaster Management and Relief operated post-disaster relief operations and recovery activities. Some degree of conflict emerged between these ministries owing to a lack of coordination and policy implementation gaps [42]. Due to the lack of necessary coordination, policy conflicts were also observed among local and regional leaders, local government organizations, and institutions implementing flood management policies. Nevertheless, the policy discourse assisted in mainstreaming flood preparedness and mitigation programs in the activities of these ministries, instead of limiting them to post-disaster responses [45].

Over the last two decades, the Government of Bangladesh has developed several cross-cutting legislative and regulatory frameworks for disaster management, which are also regulating flood management activities in Bangladesh. Emphasizing a paradigm shift from disaster response to disaster-risk reduction, the Government of Bangladesh has developed Standing Orders on Disasters, introduced in 1997 and amended in 2010. Following a multi-hazard approach of the Hyogo Framework for Action, the standing orders' primary goal is to clarify and ensure execution of the duties and responsibilities of different agencies at all levels of disaster management [46].

The National Plan for Disaster Management, 2010–2015 was also formulated with a vision to “reduce the risk of people, especially the poor and the disadvantaged from the effects of natural, environmental, and human-induced hazards” [47]. This National Plan guides the comprehensive process of disaster management in which flood hazards management has a significant role. The 2012 Disaster Management Act was enacted to ensure the delineation and implementation of the responsibilities of all stakeholders associated with disaster management.

Several policy frameworks for the management of the wetland in Bangladesh were also developed in Bangladesh following independence in 1971 [48]. For example, the Wetland Policy, 2009 addressed the issue of land leasing in the northeastern regions of Bangladesh. In addition, as a result of pressure created by civil society organizations, a Haor (wetland) Master Plan was developed with the help of Concern Worldwide in 2012 to achieve economic and social development via integrated planning and implementation [49].

Serious policy gaps in local level flood management still prevail that require radical shifts. One such gap appeared during the 2017 flash floods in the northeastern region of Bangladesh when the lack of bureaucratic attention and decisions regarding flood embankments delayed needed reinforcement activities. The government authorities were even reluctant to declare emergencies necessary for providing assistance to the flood victims [50], as they alleged that the local people were responsible for cutting and breaching the embankment. Investigations by the Centre for Policy Dialogue, a national research organization, have revealed that corruption and a lack of accountability in the maintenance of embankments caused malpractices in the management of water resources, flood control, and prevention [6,51].

Finally, in the early 21st century, flood disaster preparedness and flood risk mitigation activities have continued to receive wider policy attention, although the trend has not been linear as different policy frameworks were initiated at different stages and considered issues immediately at hand.

## 5. Drivers of Policy Change

Understanding change in flood and water management policies in Bangladesh requires examination of the roles of various endogenous and exogenous drivers that brought about major shifts in policies and programs [52]. In line with our theoretical framework and in relation to the nature of change, we divided drivers into the following two broad categories: (i) drivers that brought incremental changes, and (ii) drivers that led to radical shifts in policies.

### 5.1. Drivers of Incremental Policy Change

Drivers of incremental change in policy are characterized by both endogenous and exogenous factors. The key endogenous driver of change in policy goals and objectives is learning from failures. The first lesson was concerned with the change in policy goals due to learning that top-down approaches overlook diverse ecological and environmental issues, especially in the context of a dynamic active delta, such as the Ganges Delta in Bangladesh. The FAP, for instance, caused serious concerns among knowledge elites, policymakers, and the public about its environmental feasibility and economic gains. Subsequently, mainstreaming environmental and local contexts into policy processes played a pivotal role in instigating a new policy path. For example, an initiative was undertaken for the preparation of the National Environment Management Action Plan. Public opinions and the engagement of local people received a high degree of importance in the policy process. These critical aspects brought about remarkable changes in policy guidelines for participatory management and were embedded in the decision-making processes of flood management in Bangladesh. As a result, the participatory approach to floods and water management in Bangladesh has been gaining prominence since the mid-1990s [13,34,42].

The second key lesson was the recognition that people's livelihoods and food security should not be separated from flood protection and control measures. Much of the structural interventions were not ecologically friendly, whereas the preservation and maintenance of sustainable ecosystems are critical for their services. Critical policy discourses led to the formulation of an "ecologically sustainable water resource policy guideline" [3].

The third key endogenous driver of incremental change has been institutional learning, i.e., learning through trial and error and from failures formulating changes in policy instruments. For example, over the past 70 years, beliefs and the disciplinary ethos regarding structural-engineering interventions dominated flood management policymaking processes in Bangladesh. Learning about their limitations and from the failures [15] of these engineering schemes brought a minor modification in flood-control thinking in Bangladesh. Large-scale structural interventions were inconsistent with the geographical conditions of various regions of the country, and numerous studies [3,4,12] have revealed that these large-scale projects generally failed to reduce flood losses in the country. An investigation by Haque [3] revealed that maintenance cost of the large-scale schemes was higher than medium and smaller projects and the goal of achieving self-sufficiency in food production was unsuccessful. Institutional learning about these facts resulted in major shifts in policy instruments, i.e., from large-scale structural mechanisms to small-scale projects (Table 2).

Exogenous drivers that shaped policy goals and instruments include the influence of specialized knowledge and interests of large international donor agencies. In the early 1970s, various studies, such as the Krug Mission Report, the 1963 Hardin Report, and the 1964 Thijsee Report insisted that floods could be controlled through large-scale engineering works. On the basis of these reports, the donor agencies brought in exogenous ideas to formulate the flood and water management policies in Bangladesh. These included massive structural measures, including building dams, levees and barrages, and channel drainage, that were undertaken to control floods and to increase food production.

**Table 2.** Drivers of instrumental policy change in flood prevention policies of Bangladesh 1954–2018.

Phase	Coalition	Human Beliefs	Priority Sectors	Policy Initiatives	Technical Issues	Key Drivers for Policy Formulations (Endogenous or Exogenous)	Environmental Beliefs	Causes of Policy Failures
<b>Structural Phase (1947–1987): Large-scale and Small-scale Engineering Scheme</b>								
1947s–1970s	Engineering	Structural belief	Massive structural mechanisms for food production	A 25 Year Master Plan	Ignoring flood contexts and ecological factors in designing and planning	Donors-driven interests and mega projects	Engineering solutions were viewed as the main way to control nature	- Technically inconsistent with geographical aspects - Too large projects - Largely ineffective and incompetent - High maintenance cost
1971s–1987s	Engineering policy coalition between prooferers and embankers	Technocratic belief	Low-cost small-scale projects for food not flood	Minor adjustment in flood-control mechanisms	Questioning about the capacity of engineers in managing structural infrastructure	- A devastating famine in 1974 - Political change - Independence - Institutional change	- Ignoring local context and flood dimensions - Protecting nature for flood and crop production	Unsuccessful in food sufficiency
<b>Structural and Nonstructural Phase (1987–1995): FAP Regime</b>								
1989	Political coalition for structural and non-structural solutions	Return to structural beliefs	Water resource management	Flood Action Plan (FAP)	- Technical viability and economic benefits return - Availability of water during the dry season	- New Technology - Learning of flood control from other countries like the U.S.A, the Netherlands - Global political imperative - Political factors	- Limited understanding of flood context - Overlooked ecological and environmental issues	- The inappropriateness of engineering solutions - Inadequate benefits from agricultural sectors - Negative impacts on livelihoods - The dearth of legitimacy in decision-making

Table 2. Cont.

Phase	Coalition	Human Beliefs	Priority Sectors	Policy Initiatives	Technical Issues	Key Drivers for Policy Formulations (Endogenous or Exogenous)	Environmental Beliefs	Causes of Policy Failures
<b>Post-FAP Phase (1995–Present)</b>								
1995s–2000s	Advocacy coalition	Public participation	Water management, not flood Drainage development	- Policy guidelines for participatory management - Focus on smaller projects	- Incomplete information and knowledge - Availability of water during the dry season	- Mainstreaming environmental and local contexts - The policy debate over FAP - Public movement - The growing interest in community-based management	Environmentally viable	- Detrimental effects of embankments and pollution - Lack of good governance - Controlled-command decision processes - Filling water bodies for urban growth and wetlands for rehabilitation-Less emphasis on public opinions
The 2000s–present	People-centered harmonious coalition	The risk-driven approach, Need-based	Flood risk reduction at the different cycle of flood management	Coherent and cross-cutting policies	Building community resilience	- International policies and accords - Involvement of community-based organizations, NGOs, of media - New technology for early warning and forecasting (Interactive voice response) - Social network - Active participation of community members - Gender inclusiveness	- Ecologically and environmentally friendly structure - Sustainable resource management - Importance of local knowledge	- Empowering local political elites - Patron-client relation at the lower tier of government Indulging interests of local elites - Incomplete information on local and traditional knowledge

The second exogenous driver has been compliance with international declarations, such as the 2005–2015 Hyogo Framework for Action. During the post-FAP period, international policy drivers and plans in the field of disaster risk reduction and climate change accelerated policy shifts in Bangladesh. Following the priorities of the Hyogo Framework for Action, the government introduced other seminal policies for flood-disaster management in Bangladesh. These policy frameworks call for more “people-centered” approaches, with the objective of building and strengthening resilience at the community level. At present, a community-based approach to flood risk reduction is seen as a key outcome of the continuum of the policy shifts and changes in Bangladesh. Engagement of community members and input from them is leading decision makers to introduce low-cost, environmentally friendly structures, along with nonstructural interventions for flood management. Indigenous knowledge is also gaining significance due to its capacity to insert time-tested local perspectives and resources in flood management strategies. The recognition of the role of community members has become a new way of thinking, which is forcing policy shifts and changes in implementation processes in Bangladesh.

### *5.2. Drivers of Radical Shifts in Policy*

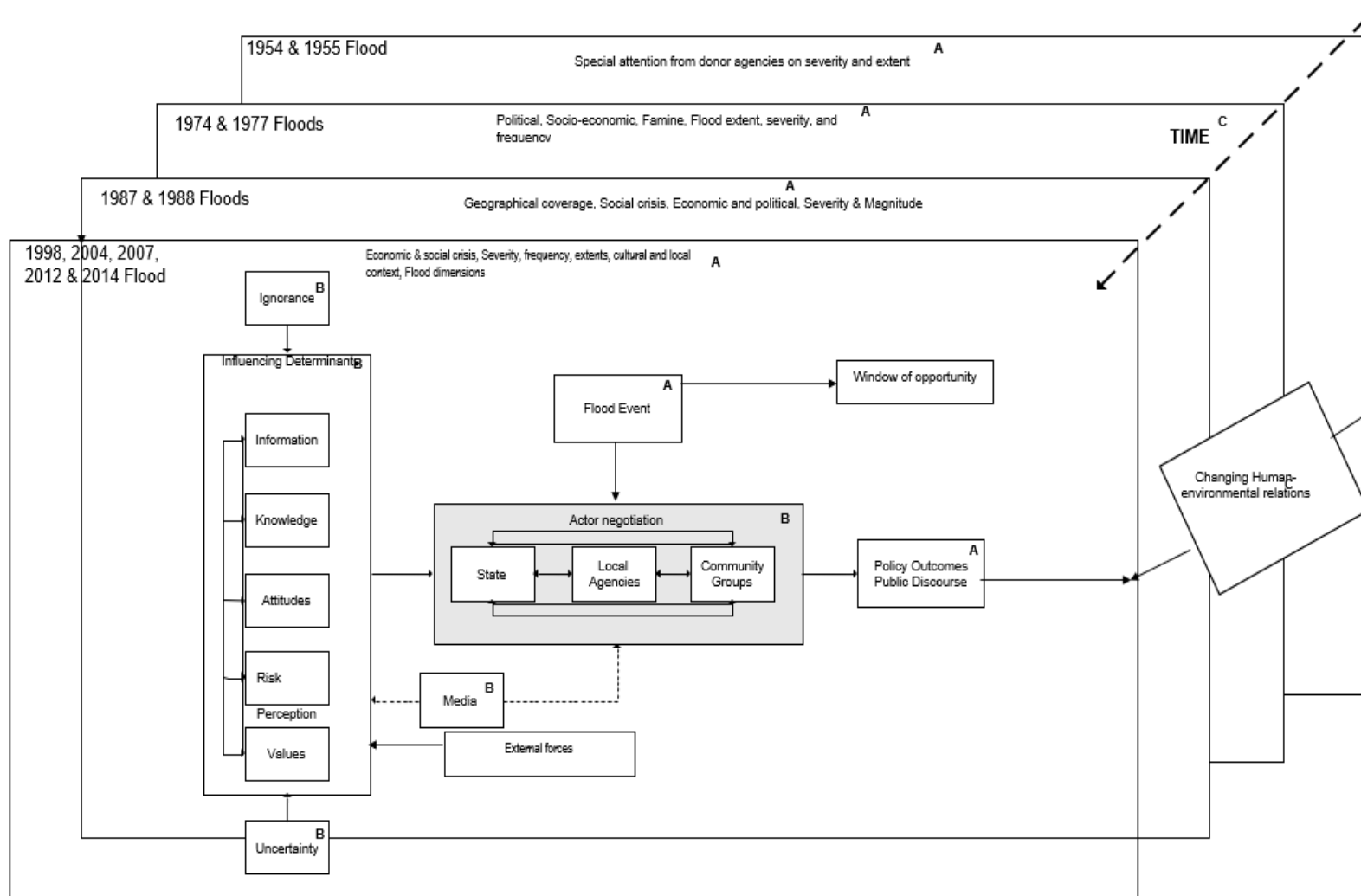
In order to examine the nature of policy change, we also considered flood extent, severity, and frequency of floods as triggers to reshaping policies in Bangladesh, recognizing that major disaster events could be drivers of radical shifts in policy. The historical account notes that after the catastrophic flood of 1922 the British government of Bengal formed the North Bengal Flood Committee for flood management in Bengal. However, since the early 1950s a series of devastating floods offered “windows of opportunity” [27] to formulate new flood policies. The most catastrophic floods occurred in 1954, 1955, 1974, 1977, 1987, and 1988 [3]. Many studies [3,9,40] have revealed that the frequency of floods and mass casualties were key drivers in policy thinking and transitions (Figure 2). These driving forces made cumulative changes in flood management policies in the country. Certainly, the flood events themselves played a catalytic role to reshape flood control, prevention, and to impact management policies.

The floods of the late 1970s, and especially the 1974 flood, caused the deaths of over 2000 people, which affected the employability of poor laborers and caused a widespread famine in Bangladesh. The 1974 flood event led international donors and policymakers to rethink the benefits of large-scale structural projects. Because of failures in achieving the intended goal of food security, the country introduced small-scale projects for flood management.

We also recognized that there were some adjustments in flood-disaster management policy beliefs. Adjustments were made due to the influence of donors’ interests and a coalition of engineering advocates. However, within a short period, two consecutive floods, in 1987 and 1988, devastated the country. Approximately 46 percent of the country was inundated, and more than 40 million people required evacuation due to the 1988 flood [3], therefore, it received remarkable attention from the international and national media. The 1988 flood, which wreaked the worst havoc in decades, brought a new dimension to the flood management strategy. An integrated water management approach to the floodplain and flood forecasting made inroads in the policy domain, as these flood disasters played a catalytic role in the formulation of a regulatory and legislative framework [9].

Over the last few decades, the catastrophic floods in 1998, 2004, 2007, and 2017 undermined the economic growth and performance of the country and exacerbated social crises [4,47]. These devastating floods generated considerable public interests and opened the doors to new policy development. The policy debate is still continuing, with more insights from stakeholders and other policy actors injected into policy formulation processes. Indeed, the policy debate is significantly influencing and reshaping policy processes, chiefly based on learning from past experiences.





**Figure 2.** Flood-driven policy transition model. Source: Developed by authors based on Johnson et al. model [27].

## 6. Role of Actors in Policy Discourse

Actors (e.g., individuals, organizations, interest groups, and pressure groups) that shaped flood and water management policies in Bangladesh have been both endogenous and exogenous in nature. Exogenous actors, such as the UNDP and World Bank, and international consultants, engineers, and hydrologists were dominant players in developing and implementing structural policies. Between the 1950s and 1960s, the World Bank was the key actor in developing, reshaping, and implementing large-scale flood prevention policies in Bangladesh. During this time an “engineering coalition” crystallized among the government elites, donor communities, and engineers [9]. Policy development and execution processes were significantly influenced by the donors’ notions and engineering beliefs due to the limited capacity of the local technocrats and bureaucrats.

Our policy analysis also reveals that after the Liberation War, the World Bank was also a key player in the policy transition process. The World Bank promulgated a study on the land and water sectors, which influenced a policy shift from a capital-intensive structural approach to more low-cost structural solutions. The Asian Development Bank and the Dutch government were also dominant players in flood control and prevention strategies in Bangladesh. Due to donor dependency, however, national water and flood management organizations were less successful in achieving their intended goals.

In the mid-1990s, numerous endogenous actors, including knowledge elites, civil society, international and national NGOs, and local community people, were critical of the FAP, and in the process helped shape disaster management policy objectives and instruments. In addition, Care Bangladesh, Oxfam Bangladesh, Action Aid, and numerous other international NGOs who were concerned with uncertainty with the ecological and socioeconomic effects of major structural interventions assisted in mobilizing international stakeholders to help local coalitions and serving public interests.

Formal participation of all stakeholders began under the National Water Policy, and a guideline for Participatory Water Management was formulated. Subsequently, the Bangladesh Water Development Act, 2000 organized a few stakeholder consultations and workshops [7]. Such approaches and events galvanized local actors, such as NGOs, community-based organizations, local communities, and local leaders, to participate in debates and actions for reducing flood risks and managing flood impacts [13].

Coordination among multiple government and nongovernment actors shaped overall policy objectives. Presently, 53 government organizations and 13 ministries are working on flood management issues and are attempting to adopt a participatory approach. The Ministry of Water Resources is the sole national institution working with the issues of flood management and the dissemination of flood information but is doing so in cooperation with the Bangladesh Water Development Board, Water Resources Planning Organization, and Flood Forecasting and Warning Centre. In addition, the Ministry of Disaster Management and Relief has taken various steps in association with the Department of Disaster Management for enhancing interdepartmental coordination. During flood periods, overall coordination is presently carried out by the Inter-Ministerial Disaster Management Committee.

Considering the importance of the more recent participatory approach, the Government of Bangladesh has set up an institutional partnership and formed various disaster management committees from the top levels to the lower tiers of government structure [14]. Applying the participatory approach, international and national NGOs, such as Care Bangladesh, Oxfam Bangladesh, Action Aid, BRAC (Bangladesh Rural Advancement Committee), and Disaster Forum have undertaken numerous activities at different phases of flood hazards management [14].

The active participation of private actors, for example, banks, entrepreneurs, and insurance companies, however, is generally absent in policy formulation and the implementation process. During the post-flood period, these actors do participate in some recovery or relief programs as part of their corporate social responsibilities. It is evident that, although the nature and extent of involvement of actors varies based on their roles and positions in society, inclusiveness at the various stages of the flood management continuum has been a key criterion of success in policy formulation and implementation in Bangladesh.

## 7. Conclusions

Our study underscores that the development of water and flood-disaster management policies in Bangladesh was a nonlinear and iterative process. Multiple drivers and actors were responsible for both incremental and radical shifts in policies. Among various drivers, major flood-triggered events, policy discourse, and institutional learning played critical roles in such shifts [39,53]. For instance, the devastating floods in 1974 shifted a large-scale engineering approach to more low-cost solutions. In a similar vein, the floods of 1987 and 1988 influenced policymakers to initiate the FAP in 1989. Findings of our study further demonstrated that although floods were considered catalysts, policy formulation and implementation strategies drew upon other approaches implemented in the USA and the Netherlands. Heavy reliance on such exogenous factors often resulted in detrimental effects on the deltaic and floodplain social-ecological systems of the country.

Flood and water management policy discourses in the last seven decades in Bangladesh oscillated from a top-down approach to a decentralized and participatory decision-making mechanism. Between the 1950s and 1995, the adoption of a flood control approach chiefly using structural interventions was dominant among the donor communities, bureaucratic elites and political interests. During this period, a policy coalition persisted between the bureaucratic and political elites within the policy community. However, policy failures of the command and control model [15,34] triggered policy debates and concerns about the technical and economic viability of structural solutions. This model could not succeed in ensuring community resilience to disasters and sustainable livelihoods in flood-prone areas of Bangladesh.

A critical turning point in generating a new “punctuation” in the overall policy approach was the inclusion of the voices, opinions, and learning of stakeholders. In the early 1990s, policy debates between the bureaucratic elites and the members of civil society (including social scientists, environmentalists, journalists, practitioners, and civil society organization leaders) were key factors in bringing modifications to flood policies in Bangladesh. The policy transitions and shifts, therefore, were also influenced by concerns about environmental impacts and political pressure from civil society organizations. To overcome the prevailing policy gaps, the participation of local people and attention to the local contexts of floods were seen to be important elements in the policy formulation processes. Overall, both incremental policy modifications and flood-triggered discourse initiated inclusive coalitions among policymakers, practitioners, and local people.

At present, an inclusive approach, labeled a “people-centered” model [34], is receiving the most attention in formulating flood and water management policies in Bangladesh. The strength of this approach is that it enables the incorporation of a community-based governance approach to flood management at the community level. This broader, integrative approach not only helps to protect communities and resources from floods, but it also buttresses the capacity of the community to prepare for and respond and adapt to uncertainty concerning flood disaster risks. This emerging people-centered, inclusive approach also creates an opportunity for concerned actors to generate and assert new ideas into the policy formulation processes. Overall, the findings of our study suggest that a harmonious coalition among the relevant actors is needed to generate socio-culturally sensitive and environmentally friendly ideas, which can only emerge from an inclusive process and active participation of stakeholders, in the flood and water management policy process.

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