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REGULAR RESEARCH ARTICLE

Revealing the Multilevel Actors Power Network in Mangrove Forest Governance - Insights from the Sundarbans, Bangladesh

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ABSTRACT

Having diversified ecological and socio-economic function of the Sundarbans Mangrove Forests (SMF), its governance significantly relies on the power relations among multidisciplinary actors present at the multiple level of jurisdictions from national to local level. The analysis elicits the identification of actors and the extraction of their interrelationships based on different power resources, which frame power interaction of the multilevel mangrove governance for the SMF of Bangladesh. Actors were identified by snowball approach and then qualitative interviews to them were carried out. A web-based mapping tool was used for extracting social network analysis of multilevel power relations for the Sundarbans' governance. The revealed power network indicated that the national level state actors (e.g., actors from government and administration category) were driving all sorts of power sources; coercion, dominant information and (dis-)incentives over the actors at local level emphasizing cross-cutting policy issues and multifunction of the mangroves. The local level non-state actors' (mostly NGOs) proactive and participatory approaches delineated as bridging role in mangrove governance between national level state actors and local level user actors based on coercive, (dis-)incentives and dominant information power elements. The actors at the local level user category didn't show any substantial effects on policy decisions. To analyse the effects of policy implementation and growing competitiveness on the ground, in regard of subsidies amongst the different actor groups further research is needed.

KEYWORDS

Power network analysis; Mangrove forest policy; Actor-centred power; Multilevel governance; Sundarbans Mangrove Forest.

1. INTRODUCTION

The environmental and socio-economic significance of mangrove forests at the local, national and global scale is vital that has widely discussed in the previous scholarly literature (Asihing, 2014; Biswas et al., 2007; Ha et al., 2014; Khan et al., 2020; Roy et al., 2012). FAO (2007) in the "World Mangrove Forest (1980-2005)" publication reveals multiple functions of mangroves, such as providing wood and non-wood forest products, protecting shores against the wind, waves and water currents; conserving biological diversity; providing habitat, spawning grounds and nutrients for a variety of fish and shellfish, including many commercial species. The Sundarbans Mangrove Forest (SMF) of Bangladesh is the largest contiguous single tract of mangrove ecosystem globally (Hussain & Karim, 1994; Siddiqi, 2001), 6,01,600 ha is 4.13% of the country's total land area (BFD, 2021). Around 3.5 million coastal community depends mainly on the natural resources of the SMF for their livelihood (Kabir & Hossain, 2008, Roy, 2017). Given the diverse ecological functions and economic importance, the SMF brings multiple actors - their interests and power politics to the fore for its exploitation, management and policy-making (Asihing, 2014; Khan & Giessen, 2021).

The success of a policy, including its formulation, implementation, monitoring and evaluation, depends on the cooperation and collaboration among a network of multilevel actors (Martins & Borges, 2007; Krott, 2005). In addition to state actors, various sub-national and local NGOs, private actors and interest groups increasingly integrate and interact with the state policy actors for common-pool resources management decisions (Kull, 2016). In this regard, new form of governance, for example, formal and informal networks, unit of cooperation, association and working groups, have been set up to foster resources management and policy-making (Kull, 2016; Kazepov, 2017). Hence, analysing the power relationships in polycentric or multilevel forest governance is central for the sustainable management of mangrove resources (Maryudi & Sahide, 2017; Arts, 2014). The multiple sources of power or power elements influence the actor to become powerful and greatly influence the policy and decision-making in resources governance (Krott et al., 2014; Rahman et al., 2021; Giessen et al., 2016; Rahman et al., 2016; Schusser, 2013). According to Krott et al., (2014), the power sources of an actor are defined as dominant information, incentives and coercion. An actor can be considered as powerful if he can push through his interests regardless the other actors will. Moreover, the power implies ownership of policy instruments that can be used to gain various formal and informal interests out of this governance process (Boer, 2020; Maryudi & Sahide, 2017; Rahman & Giessen, 2017; Böcher, 2012).

In general, the central bureaus, the Prime Minister's Office and Finance and Administration, have more reputation and power resources such as: advanced information, incentives/disincentives, coercive rights, and means, than the peripheral bureaus and actors (see Rahman et al., 2021). Thus, analysing the existing power networks and exchanging power resources among multilevel actors is the key to comprehending the existing governance mechanism on the one hand. On the other hand, the analysis will be beneficial for setting the limit and direction of mangrove policy and management in the context of national and international development aspects. The study grounded on the solid theoretical argument on actor-centred power, multilevel governance and distributive effects of power elements. Methodologically, the study is based on rigorous qualitative data, i.e., interviews (n=41) from top to bottom among multilevel actors applying the Social Network Analysis. The analysis assesses the network of actors, i.e., more powerful and less powerful actors and interchanges of resources in real analytical terms to identify the trade-offs, reciprocity and denial or non-cooperation among actors at all levels of mangrove governance.

2. THEORETICAL AND ANALYTICAL FRAMEWORK

2.1 Actor-oriented power and power elements

2.1.1 Actor theories and analyzing actor categories

Actors are the key players, ranging from different government or non-government organizations to individual persons (Krott, 2005). They have active roles in relation to specific issues, and perform a plan of action based on self-interest, often covertly. Specifically, an actor is defined as “a social entity, a person or an organization, able to act on or exert influence on a decision. In other words: actors are those parties that have a certain interest in the system and/or that have some ability to influence that system, either directly or indirectly” (Enserink et al. 2010: 80). Schusser et al. (2015) defined actor as an entity that has a distinct interest and possibility of influencing a policy. In social relation, scholars also use stakeholder as synonymous to actor (Enserink et al. 2010) since stakeholder also refers to individuals, groups or organizations that possess interests or a partake in decision-making processes and can influence or are being

influenced by an evaluation process or its outcomes (Bryson & Patton 2015). Based on the definition of actors and stakeholders, the term 'actor(s)' is used in this analysis who posits in multilevel governance on the Sundarbans Mangrove Forest (SMF) in Bangladesh, with a distinct interest in it and a possibility of influencing or being influenced.

In the current context, actors are analyzed based on the classification of Krott (2005) as forest users/dependents (i.e. local inhabitants and workers), associations and political parties, and government and administration, that further elicited by Khan et al. (2020) with a particular case of the SMF in Bangladesh. Practically, the government and administrations are responsible for ensuring public welfare and exist as powerful public actor at the center of the political organization (Krott, 2005), where political decisions in general come from. This category comes from the national-level state actors, which are mainly ministries and departments—i.e. public organizations, responsible for implementing government agendas in relation to specific field of interest. Development partners (often known as donors) are being categorized in this actor category, which provide technical and financial support (Aurenhammer, 2012; Rahman et al., 2016).

In the actor category of 'associations and political parties', according to Krott (2005), associations representing organizations attempt to implement their interests by lobbying politicians. And, political parties are also kind of voluntary organizations which work independently to promote votes in competition with other parties, with the goal of representing themselves when elected to political office (Krott, 2005). The Mangrove Forest User group comprises of who are benefitting, mainly economic from the Mangroves (Schusser et al., 2016)—i.e. honey collectors, fishermen, boatmen, tour operators etc.—in the Sundarbans. According to Schusser et al. (2015), actors exist on different geographical levels and build social relationship through exchanging information. However, actors' position made them interlinked as Böcher & Töller (2012) rightly pointed out that actors' interests determined as driving factor in a way how actors behave. Understanding the issues and interests related to effectiveness of any forest management planning, thus decision-making could be improved with prior actor analysis and organizing its network in a participatory process (Marques et al., 2020; Martins & Borges 2007). Specifically, actor analysis provides insight into the main actors' concerns related to the forest management, from local to national level; assesses the influence and the power resources that different actors can have on forest management decisions; and identifies actors' relational influence.

2.1.2 Actor-oriented power and its relevance

Power is assumed as capability of an actor to influence other actors, which makes it difficult with practical politics since it is an invisible force in nature mostly (Krott et al., 2014). Scholars have some confusion with the power factor in forest governance and politics as it disappears oftentimes and used the terms 'influence' or 'capacity' instead of power (Silva, 1997; Winkel & Sotirov, 2011)—which seems power debate is very diverse having it produced different terms, overlaps and partly contested (Krott et al., 2014).

Since, actors are the basic factors in policy analysis and sometimes adhered with organizational hierarchical structure, we assume that both the structural hierarchy and actor itself do something specific with power that is applied within a policy field. Thus, we follow all the three layers proposed by Arts and van Tatenhove (2004), where power is also considered as a part of structural layers other that based on single entity or a structure as stated above. Furthermore, identifying the resources or elements seems as important to describe actors' power capability in a social relation. The concept of allocating authority or physical sanction to the subordinate actors and distributing

economic means (material resources) for implementing policy tasks were considered as the important elements in actors' power analysis. These two basic concepts of power resources were conceived in the literature of Etzioni (1975) and Krott et al. (2014). The first one delineated as power based on 'coercion' and second one was based on 'incentives'. In addition, Krott's school proposed 'dominant information' as a power element as it acts to influence on other actor's behavior also. And, in this idea, Etzioni's power component of normative one (symbolic reward) was merged with 'incentives' category. Hence, the authors' tried to follow one of this novel contribution in the theory of actor-oriented power analysis—i.e., Krott et al., (2014)'s three elements: coercion, (dis-)incentives and dominant information, which were revealed as the core instruments of actor-centered power in community based forest governance.

This actor-centered power approach defined as an actor can alter the behavior of another actor without recognizing latter's will in a social relationship (Krott et al., 2014). Here the actor, who alters is called 'potentate' and whose behavior is being altered is called 'subordinate' actor. First of all, if the subordinate's behavior is altered by force, threat of force or physical actions of potentate, then this is coercive power. Secondly, altering the behavior by means of disadvantages or advantages falls under the type of power element, (dis-)incentives. And finally, dominant information is also a power source, where subordinate's behavior is altered by means of unverified information received form potentate (Krott et al., 2014; Schusser et al., 2015). This study used the actor category of Krott (2005) for analyzing aforementioned power elements to produce network relationship for the multilevel mangrove governance in Bangladesh as an illustrative case.

2.2 Multilevel Governance (MLG) and distributive effects of power elements

Multilevel governance creates dispersion of administering responsibilities or power among multiple jurisdictions in order to ensure more flexibility rather to concentrate these functions in one jurisdiction (Hooghe & Marks, 2003). Early article by the pioneer scholar on multilevel governance defined it as 'a system of continuous negotiation among nested governments at several territorial tiers - supranational, national, regional and local - as the result of a broad process of institutional creation and decisional reallocation' (Marks, 1993: 392). Adopting this definition, later on, other scholars developed MLG further including non-governmental actors as similar diffusion of authority presumed to happen (Hooghe & Marks, 2003; Ircha & Young, 2013, Leuprecht & Lazar, 2007; cf. Alcantara et al., 2016). Hence, decision making powers are distributed and custom designed with such variation in mind across multiple level of governances. For example—multilevel governance of the European Union is solely network based among different jurisdictions (Kohler-Koch, 1996) and its authoritative allocation of values is negotiated among the multitude of public and private actors (Ansell, 2000; Schout & Jordan, 2005). Functional differentiation of multiple jurisdictions and the degree of political integration has influential role for establishing MLG (Hooghe & Marks, 2016; Trein, 2017). In addition, functional differentiation among the multiple jurisdictions lead to form relational network with task-specific deal in a given policy challenge (Leuffen et al., 2012). Even if, characteristics of policy problems are crucial for understanding the inputs, outputs and outcomes of the MLG structures (Peters, 2005; Thomann, 2018). Maggetti & Trein (2019) argued that MLG is even vibrant as it reconfigures timely while problem-generating potential and problem-solving capacity of multilevel settings can rearrange in further, upwards, downwards or sideways diffusion of power across actor levels. Therefore, capacity on problem-solving of the actors at different tiers assumed as relevant to build MLG network (Thomann et al., 2019). However, information of individual actor's power resources helps themselves

to posit in their relational network in problem-solving as well as decision making since these power elements justified them as appropriate.

Illustrating the perspectives of organizational network, the literature has observed two strains recognized scrupulously, those are relationship with *structurally rigid* and relationship with *structurally flexible*. Curry (2015), interprets as—in the former relationship, the powerful actor (i.e., power elements provider) earned power from legitimate legal or statutory basis, and the extent and bounds are well defined and closely followed by the subordinate actor (i.e., power elements receiver). The relationship with structurally flexible, the power elements are parceled out between the actors based on mutual responsibility over policy and governance issues. Hence, no actor holds clear power setting over another, and they are able to be flexible in how these issues are practically dealt with and how the accountability is custom designed for these issues. In order to solving the frame of problem in MLG, it demands sanctioning and coordinating power through determining the distribution of externalities and enforcing solutions on regional or local actors (Hawkins et al., 2016; Homsy & Warner, 2013). Therefore, it is obvious that multilevel governance of any natural resource system is not all about power direction by top-down approach. It also demands interplay of power elements among different actors on ground. MLG engages multiple actors in policy process encouraging local innovation and sharing power resources across the network.

2.3 Mangrove policies and power relations in multilevel mangrove governance

As forest policies exist at the core notion of central policy studies, scholars often elicited the successful resource management of any type of forest relies on efficient formulation and implementation of policy and legal perspectives. Therefore, understanding mangrove forest policies and relevant actors' power involvement within the forest governance is inevitable because mangrove forest is characterized as a distinctive ecosystem with a diverse range of flora, fauna, and their habitats (Islam, 2004). A multilevel collaborative actors' involvement for such a landscape of forest management (e.g., mangrove herein) is the key success factor in decision-making process (Martins & Borges, 2007), which increases the social acceptance of actions measured (Bruna-Garcia & Marey-Pérez, 2014). Moreover, understanding of state policy contexts is important for explaining forest policy development that analyzes sectoral and sub-sectoral relationships across multiple jurisdictions (Rayner, 2009; Rayner et al., 2010). Mangroves are widely treated as forest lands in the administrative policy of Bangladesh, and diverse resource interests of the mangrove forest belong to different actors at multiple levels. Therefore, this research considers power relations among multiple actors for implementing mangrove focused, related, and relevant policies as mangrove forest policies (*mangrove forest policies* were detailed earlier by Khan & Giessen, 2021).

The power of influential actors has been considered as decisive factor explaining their comprehensiveness within the broad trends in any forest governance (Agrawal et al., 2008; Brockhaus et al., 2012; Giessen et al., 2009). As such, forest governance studies often focus on analysis of particular level ranging from international to national to regional and local (Giessen & Buttoud, 2014). In the natural resources management sector, scarce resources are controlled by some the actors, the analysis of actors' power resources is helpful to support decision-making of forest policy and forest management situations (Mayers, 2005). However, implementation of mangrove forest policies is often challenging since it entails multilevel governing actors ranging from national level state actors, local level state actors and local level non-state actors with their individual power elements. To uncover, how the multiple institutions, actors and power

structures around the Sundarbans come together to create the multilevel governance, looking deeper seems important for identifying three designated power elements—coercion, dominant information and (dis-)incentives. For the sake of institutional realities, interests and performing role of different governmental and non-governmental actors are shifting in which they exist (Curry, 2015). Considering all its nebulousness of governance, relations and structures in which the actors operate around mangrove, the study tried to determine power arrangements within the MLG setting.

2.4 Linking concepts into key arguments and hypotheses

The multiple functions of the mangroves' diversified resources cause conflicts amongst the interests of multiple actors (Adger et al., 2003; Krott, 2005). These conflicts of interest remain latent until an actor involved mobilizes material or non-material resources (Yusran et al., 2017). Actors' power largely drives the resources mobilization through which they interplay and build network relationship to implement particular policies of a given sector. Moreover, dynamics and asymmetry in power relations trigger conflict escalation among actors at multiple levels of governance (Wang et al., 2024). Coercion and dominant information act as non-material power resources whereas (dis-)incentives act as materialistic power sources of an actor. Mangrove governance entails different sectors embedding diverse interests of the actors (Khan & Giessen, 2021). Moreover, the SMF's surrounding coastal community—about 3.5 million people—depends largely on the natural resources of the SMF's for their livelihood (Kabir & Hossain, 2008, Roy, 2017). Apart from the actors of national state level, some local level private actors and user group actors are grown-up with their own interests for due reasons, multiple functions of the SMF—for example (i.e., timber extraction, fisheries, honey production, mass education, sanitation and health service of local people, small entrepreneurship, agriculture etc.). Actor analysis is adapted from Khan et al., (2020), where examples of actors provided a clear idea in understanding different type of actors at multiple levels for managing mangrove forest (applicable for the SMF in Bangladesh).

Conventional understandings of power lead multiple actors to arrange the immediate necessary action following existing rules and procedures in order to implement policies. Individual power action by particular actors embedded in wider configuration seemingly influence as significant and effective power exercise within the network (Newell, 2006). Importantly, the relationship among various level of actors describes power analysis in policy process (Brukas & Hjortsø, 2004). Moreover, dichotomies were sorted as some power theories "situate power at the level of acting agent, while others situate power at the level structures" (Arts & van Tatenhove, 2004: 347)—for example. Therefore, we relate visible or invisible capability of actors that determines other actors' action/position with mangrove governance in multiple jurisdictions and avoid vague connection to power observations in the same network.

Although studies on multilevel governance have increased in recent years, what remains still unknown is whether the power relations across multiple levels of actors have any impact over policy decision-making processes. However, understanding the challenges over MLG as a whole is recommended to be explore as it may help to highlight the local level actors as important part in decision making in the contemporary diffusion of power away from national level actors (Harmes, 2006). Thus, this study explores the cross-institutional power relations between national level and local level state actors; and between state actors and non-state actors assuming key observable facts for facilitating and hampering mangrove policy implementation. Considering the multilevel governance for the Sundarbans, we assume the following

three hypotheses in this study on the basis of the aforementioned reflections from theoretical and argumental aspects:

- ***H_1:*** *National level state actors lead the mangrove governance based on coercive, (dis-)incentives and dominant information power elements.*
- ***H_2:*** *Local level non-state actors act as bridging role in mangrove governance based on coercive, (dis-)incentives and dominant information power elements.*
- ***H_3:*** *Local level user actors have substantial role in mangrove governance based on coercive, (dis-)incentives and dominant information power elements.*

3. METHODOLOGY

3.1 Study context and case selection

The study focuses to reveal the power network of multilevel governance on the Sundarbans. Having numerous necessary functions from the productive, protective, and social points of view, mangroves possess high salience for livelihoods (Rahman, 2000), and is generally considered a good case for any kind of empirical study. Involved actors in the governance of the SMF, may range from concerned livelihood-based mangrove user groups to local level non-governmental organisations to state-level government bureaucracies. The government and donors emphasize the sustainable uses of the SMF's resources and minimizing the anthropogenic pressure on this highly valued mangrove forest. In ancient period, the forest sector followed the tradition of utilitarian facets, whereas conservation aspects introduced as new practice under sustainable forest management—brought complexities into the mangrove governance. Therefore, we chose the SMF as an illustrative case for having large variety of actors' engagement within its governance and management.

There are three adjacent districts to the Sundarbans—named Satkhira, Khulna and Bagerhat. Initially researchers focused four upazillas[1] (Shyamnagar, Dakope, Koyra and Mongla) from the above districts were primarily considered for further scrutiny. Then the researchers checked the websites of the upazillas to get information about the presence of different actors with their activities; later, officials of the few NGOs and upazilla administrations were contacted by phone-calls to find out more about the information given on the websites. Comparing the provided information, researchers decided to select one upazilla (Shyamnagar of Satkhira District) as a representative case to obtain further data and in-depth information needed for analysis. The location of the selected upazilla is given in the figure-1. The study area of Shyamnagar upazilla is located approximately 110 km south-west of Khulna city, in south-western Bangladesh region. This research has been carried out with the prior selection of an upazilla (a local administrative region close to the SMF) in Bangladesh. It is particularly interesting because most of the state bureaucratic actors operate their field level activities in the upazilla with their extended offices from national level. Closeness to the SMF creates livelihood options to the local people, thus number of NGOs are grown-up in the upazilla to implement development projects, to create employment and income-generating activities to the local people. More specifically, the upazilla adjacent to the Sundarbans has multiple actors' operational activities that facilitate our context of relevancy in mangrove governance. Considering the hypothesis of this research, some issues were addressed before the final choice of the upazilla was

[1] Upazilla is a Bengali name (translated form in English is 'sub-district'), is the administrative region under district. The upazillas (at present there are 492 upazillas in Bangladesh) are the second lowest tier of regional administration in Bangladesh. The administrative structure consists in Division, District, Upazilla and Union Parishad.

made—having large number of state bureaucratic actors, considerable number of NGOs and different associations, diversified forest user groups, access point to entry in the SMF for different organisations and year-round vibrant livelihood activities for the local people.

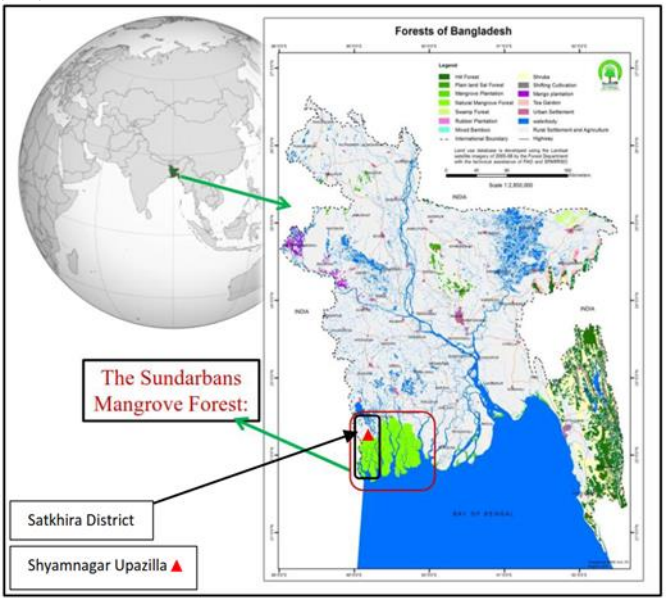


Figure 1. Location of the Sundarbans mangrove forest and Shyamnagar Upazilla (study location for collecting local level data). [Source: Bangladesh Forest Department; adapted from Khan & Giessen, 2021]

3.2 Empirical data and field access

After finalizing the case, a field survey was carried out by the first author in the period September-October 2020. He collected information and conducted open-ended informal interview with officials of different governmental actors at the national and local level, different local NGOs and associations, representatives from different livelihood or mangrove user groups at local level. All possible actors were identified using *snowball technique* (see next section). For collecting required information from different actors, a very briefly questionnaire was introduced (Table 2) during field visit.

In the step of field visit, firstly, accessing to the different ministries and departments[2] was utmost consideration, where the first two authors were responsible to execute. Being long-standing civil servants to the Government of Bangladesh since 2005, their professional networks facilitated our access to different actors from the category of 'bureaucracy and administration' for conducting interviews to the focal persons of different organisations. Their working experiences in program/project based sections in different ministries generated the necessary capacity in our interviews, where the further referenced documents were needed to be collected later on. In some cases, the power flow in terms of coercion and incentives specially, the interviewees referred other official documents consisting decrees, orders, rules and regulations

[2] Departments are synonymously used for the state agencies, organizations, or institutions in the bureaucracy of Bangladesh. Departments are the subordinate offices of the line ministry, which are mandated to implement policies at the field level according to the "Rules of Business."

instead of direct replying to the questions asked for. The name and position of the interviewees weren't disclosed with the promise of their anonymity in the research article for privacy and ethical reasons. The identification of government data sources and actual interpretation of empirical data are an inevitable part of this type of study, where first two authors' experience added value through "participant observation" (Emerson et al., 2001) and "going-back approach" (Scheba & Mustalahti, 2015).

In next step of field visit in the Shyamnagar Upazilla for collecting data from different actors at the local level, the first author was accompanied by two junior researchers deployed from Khulna University.[3] These two junior researchers were experienced enough as they have conducted several field visits in the same upazilla for collecting research data from different community and organisations for other projects. This sorts of deploying facilitates easy field access which saves unnecessary time and costs, since they were well-known in the locality.

3.3 Empirical methods

3.3.1 Snowball Approach and qualitative interviews

The process of actors' identification encompassed two stages. At first, possible actors in mangrove governance were identified primarily based on the article of Khan et al., (2020), where actors were already identified under three categories of 'government and administration', 'association and parties' and 'mangrove forest user'. Hence, the actors' offices in the selected site (Shyamnagar Upazilla) specially for the NGOs and national/international organizations were checked with their activities of mangrove's relevancy. Similarly, the user group actors were identified targeting main livelihood groups available in that region. For the category of actors under government and administration, the local offices were identified which represent the state actors at upazilla and district level. Our intended questionnaire was introduced with the actors identified primarily at the local level. After each and every session of interview, we used to identify next new actors suggested by them having influence or interest in mangrove governance. This comes both from their independent opinion of new actors and the name of the actors those are mentioned from their answer in power elements' providing or receiving. We checked the new name of actors if we already not enlisted and identified as actors for next interviews. The interviews were continued until we found not a single actor through this *snowball technique* approach. This approach facilitates heterogeneous actors' selection those consisting a variety of interests, potential influence or power over the SMF, potential conflicts of interest with other actors (e.g., Marques et al., 2020). Through this process, we identified, categorized and interviewed 41 actors found (Table 1) as appropriate at the end. Thus, the completion of actors' identification was happened by interactive process (e.g., Reed et al., 2009).

Table 1. Identification of actors into different categories and number of actors found and interviewed

Actor Categories	Examples of actors (all actors are listed in Appendix-A)	Actors Found (#)	Actors Interviewed (#)
Government and Administration	Ministry of Environment, Forest and Climate Change (MoEFCC), Forest Department, Ministry of Finance, District Administration, International donors etc.	21	29

[3] Khulna University is the nearest university of the Sundarbans located in the Khulna (one of the eight divisions in Bangladesh). In this university, many researchers are experienced with local field visit for necessary data collection.

Actor Categories	Examples of actors (all actors are listed in Appendix-A)	Actors Found (#)	Actors Interviewed (#)
Associations and Political Parties	Different NGOs (e.g., Sushilan, NGF, BRAC), International organizations (e.g., CARITAS, Islamic Relief)	12	16
Mangrove Forest Users	Honey collectors, Boatmen group, Fishermen group etc.	8	13

Note: The number of actors interviewed is greater than that of actors found/counted, because in few actors, more than one interviewee was interviewed. At the end, combining the answers, a single actor was counted for this study.

Developing questionnaire was the initial stage before conducting interviews to multiple actors. the questions were set presuming to be answered very briefly and semi-closely ended by the respondents. At first, questions were created in English and then translated and adapted into Bangla[4] language to reduce the cultural barrier. Matching with theory of power elements, the possible translation in native language were adapted with exemplary observables. The whole research team contributed in developing questionnaires while first two authors (originated from case-study country) adapted this into translated language and pre-tested with few prospective respondents. Considering feedback from pre-testing, the questionnaires become improved and finalized among research team. Questionnaire was focused mainly to mention the name of the actors who are providing specific power elements (coercion, incentives and information) and from whom they are receiving these power elements (see Table 2). The research team also finalized the contextual boundaries of observable facts in each power elements applicable for the current research (Appendix-B). The example of individual power features, those were utilized in mangrove governing process, were also asked to different actors.

Table 2. Questions approached to the interviewees (Source: developed by research team).

Types of Power elements	Questions
Coercion	From whom (actors) you get permission/approval, physical action, threat, sources or possibility of physical action? And, what kind of?
	To whom (actors) you deliver permission/approval, physical action, threat or possibility of physical action? And, what kind of?
Dominant information	From whom (actors) you receive unverified information, technical knowledge, experiences, rules and regulations, orders, circulars? And, what kind of?
	To whom (actors) you provide unverified information, technical knowledge, experiences, rules and regulations, orders, circulars? And, what kind of?
(Dis-)incentives	From whom (actors) you get (or, threat of) financing, material benefit, promotion, implementation means/facilities? And, what kind of?
	To whom (actors) you provide (or, threat of) financing, material benefit, promotion, implementation means/facilities? And, what kind of?

3.3.2 Social Network Analysis

Apart from identifying the actors in mangrove governance, it is imperative to understand the power relation among actors across multiple jurisdictions, pinpointing

[4] Bangla (also known as Bengali) is the mother tongue of Bangladesh. Most of the people in the rural areas speak and understand only Bangla.

with whom are they linked and for which resources are they connected. Networks can serve as an analytical tool for demonstrating relations between actors in terms of their any variable features—power instruments, for example. Thus, a meaningful relation can then be analyzed for structural patterns that examine how actors are positioned and relations are structured into overall network (Prell et al., 2009; Scott, 1998; Wasserman & Faust, 1994; Wellman & Gulia, 1999). Social network analysis (SNA) can identify stakeholders with prominent power and relational influence, mapping the interactions through a diagram (Bodin et al., 2006; Kosorukoff, 2011). In addition, SNA is influential for analyzing and visualizing the role and position of actors in the network diagram (Paletto et al., 2016). In SNA, the nodes are actors, and the ties are the connections between them leading to the sketch of the observed governance network, thus power relation among actors is described in a social relation. At onset, all answers received from the interviews and further referenced documents by bureaucratic actors were analyzed and transcribed in excel sheet as a prerequisite for SNA. We organized the excel file mentioning the power direction from the actors to other actors. To fulfill the objective of the study, we chose a mapping tool named 'KUMU'[5] to draw the SNA, where not only the connection would be visualized but also demonstrates number of perspectives. Using this web-based mapping tool is becoming popular by number of scholars (e.g., Chuvileva et al., 2017; De Moor, 2015; McCarroll et al., 2018). For example, nodes with visibility by their own colors, captions and sizes and connections by the combination of color and width of their lines—which made visually appealing. We used the direction to visualizes the power elements flow from one actor to others. The degree of centrality was also applied to show the relational influence, where individual actors were denoted to the number of nodes and each node was tied to the others as relationships exists among them. The actor' node shown as bigger as having high degree of centrality with more power relation and influence with other actors—thus seemed more powerful in the network.

4. RESULTS

4.1 Actors' power network on *coercion*

We identified 21 actors from *government and administration* (hereafter referred as GA) actor-category; 12 actors from *association and political parties* (hereafter referred as AP) actor-category and 8 actors form *mangrove forest users* (hereafter referred as MU) actor category relevant for mangrove governance. The degree of centrality denotes some actors acts as central role in the power network (Figure 2). Hence, under GA category, Forest Department (GA04) posits the core powerful over mangrove user group actors in coercion, whereas NGO Affairs Bureau (GA11) posits as powerful in the AP actor category in the same network. For example, Forest Department issues entry permits for all the user actors into the Sundarbans and NGO Affairs Bureau approves the NGO launching. Following then, Upazilla Administration (GA02), District Administration (GA01) and Microfinance Regulatory Authority (GA10) hold some coercion power over local level non-state actor category for approving local functioning of the NGOs. Under the AP category, the NGO—named 'Sushilan' (AP01) was observed as most powerful in terms of coercion, as this NGO linked with maximum user groups for their livelihood activities as well as receives coercive power from maximum number of actors of GA category. Honey collectors (MU01) and fishermen group (MU05) were found as the prominent actors under MU actor category followed by other user groups. This seems, these two user groups were in advantageous position for receiving

[5] Kumu is a web-based mapping tool to track and visualize network relationships (https://kumu.io/)

necessary approval of livelihood packages from GA and AP categories. Looking at the network links, the actors within GA category observe internally linked for coercion among them, which found absent within AP and MU category. This is due to the imperativeness of necessary approval from one actor for another actor's activities under GA category that is not required in other categories. But the coercion power elements are needed to be applied across the level of actor categories to follow multilevel governance.

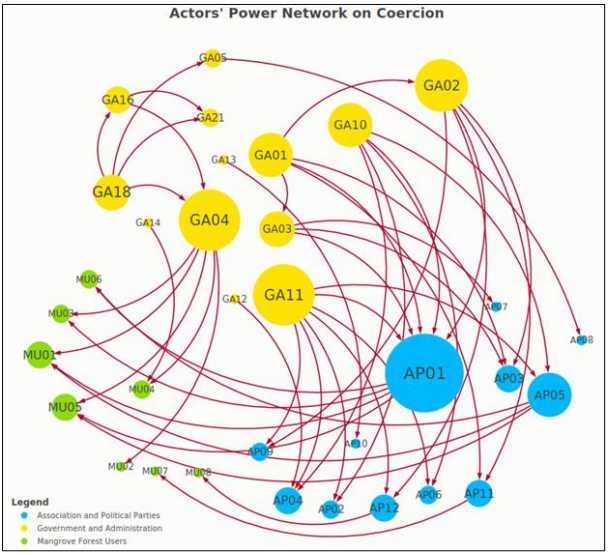


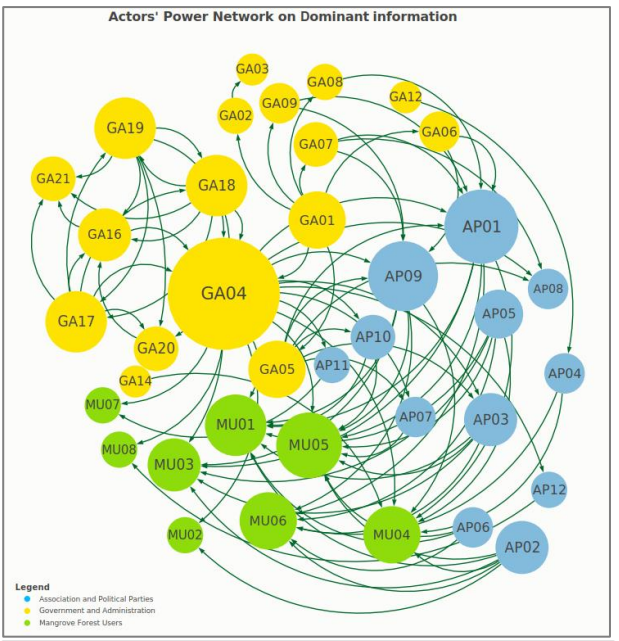
Figure 2. Power relational network based on exchange of coercions as power instrument.

Note: Nodes are sized according to the degree of centrality, the larger the node, the more power elements are exchanged by the actor with other actors. Arrows indicated the direction of power providing actor towards receiving actor (AP = Association and Political Parties; GA = Government and Administration; MU = Mangrove forest Users; *detailed name of the all actors are mentioned in the bottom part of the figure*).

4.2 Actors' power network on dominant information

The network on informational power indicates that Forest Department (GA04) holds the strongest powerful position irrespective of any categories of actors (Figure 3). Holding the responsibility, Forest Department linked with all the mangrove forest user groups for providing dominant information as power elements. Moreover, it provides relevant trainings, shares experiences to the NGOs for implementing mangrove related policies. As the sole responsible authority for administering the Sundarbans, the Forest Department took the advantageous role for communicating relevant parts of the 'National Forest Policy', 'Wildlife (Conservation and security) Act' 'Protected Area Management Rules', 'The Sundarbans Travel Policy'—for examples to the mangrove user actors. Following Forest Department, the study observes some governmental actors (e.g., GA17, GA18, GA19, GA20, GA01, GA05, GA16) disseminate dominant information (training on Project Management, Public Procurement Rules and Regulations, Perspective Plan etc.—for example) to other actors in the network, therefore show bigger nodes. Looking at the network links, the actors within GA category observe internally linked for informational power exchange among them, which found completely absent within AP and MU category. Under the actor category

of *association and political parties*, Sushilan (AP01) and CARITAS (AP09), shows numerous connections with other actors in the network for exchanging dominant information. Among user groups, fishermen group (MU05) receives dominant information from large number of actor sources, followed by other user groups honey collectors, tour operators and other community people. Since fishermen bears large community around the SMF, the actors at other level tends to provide relevant trainings (fish culture and management training, for example) and information (weather and climatic conditions, for example) to this group. From mangrove forest user groups, the study doesn't observe dominant information provided to other actors in the network. Overall, the power network based on dominant information observes more flexible structure than from coercion and incentives showing exchanging relevant power resources across and within different level of actors.



Name of the actors representing their codes indicated in the figure

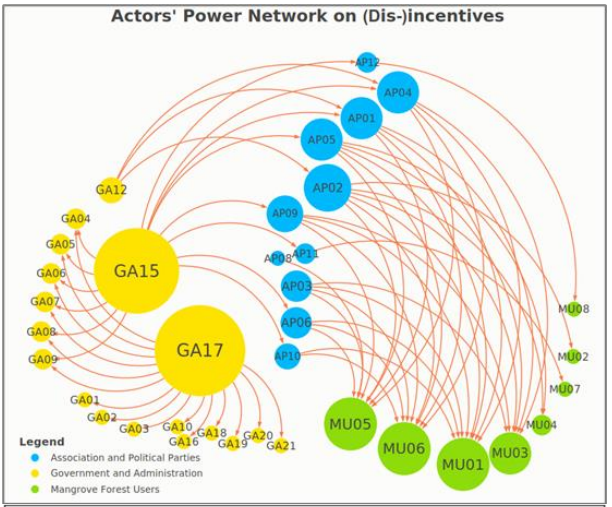
Code	Name of the Actor
***Actor Category:* Government and Administration**	
GA01	District Administration
GA02	Upazilla Administration/Parishad
GA03	Union Parishad
GA04	Forest Department
GA05	Fisheries Department
GA06	Livestock Department
GA07	Agriculture Department
GA08	Education Department
GA09	Health Department
GA10	Microfinance Regulatory Authority
GA11	NGO Affairs Bureau
GA12	Palli Karma Sahayak Foundation (PKSF)
GA13	Bangladesh Standards and Testing Institutions
GA14	Bangladesh Tourism Board
GA15	International Donors
GA16	Ministry of Environment, Forests and Climate Change
GA17	Ministry of Finance
GA18	Planning Commission
GA19	Implementation Monitoring and Evaluation Division
GA20	Economic Relations Division (ERD)
GA21	Department of Environment

Code	Name of the Actor
***Actor Category:* Association and Political Parties**	
AP01	Sushilan (NGO)
AP02	BRAC (NGO)
AP03	CZM (NGO)
AP04	NGF (NGO)
AP05	CCDB (NGO)
AP06	Islamic Relief (NGO)
AP07	Crab Farm Association
AP08	Crab Depot
AP09	CARITAS (NGO)
AP10	BEDS (NGO)
AP11	SAMS (NGO)
AP12	DALIT (NGO)
***Actor category:* Mangrove Forest User**	
MU01	Honey Collectors
MU02	Boatman
MU03	Golpata Collectors
MU04	Tour Operators
MU05	Fishermen Group
MU06	Community People (Others)
MU07	Munda Community
MU08	Dalit Community

Figure 3. Power relational network based on exchange of dominant information as power instrument.

Note: Nodes are sized according to the degree of centrality, the larger the node, the more power elements are exchanged by the actor with other actors. Arrows indicated the direction of power providing actor towards receiving actor (AP = Association and Political Parties; GA = Government and Administration; MU = Mangrove forest Users; *detailed name of the all actors are mentioned in the bottom part of the figure*).

4.3 Actors' power network on (dis-)incentives



Name of the actors representing their codes indicated in the figure

Code	Name of the Actor
***Actor Category:* Government and Administration**	
GA01	Disctrict Administration
GA02	Upazilla Administration/Parishad
GA03	Union Parishad
GA04	Forest Department
GA05	Fisheries Department
GA06	Livestock Department
GA07	Agriculture Department
GA08	Education Department
GA09	Health Department
GA10	Microfinance Regulatory Authority
GA11	NGO Affairs Bureau
GA12	Palli Karma Sahayak Foundation (PKSF)
GA13	Bangladesh Standards and Testing Institutions
GA14	Bangladesh Tourism Board
GA15	International Donors
GA16	Ministry of Environment, Forests and Climate Change
GA17	Ministry of Finance
GA18	Planning Commission
GA19	Implementation Monitoring and Evaluation Division
GA20	Economic Relations Division (ERD)
GA21	Department of Environment

Code	Name of the Actor
***Actor Category:* Association and Political Parties**	
AP01	Sushilan (NGO)
AP02	BRAC (NGO)
AP03	CZM (NGO)
AP04	NGF (NGO)
AP05	CODB (NGO)
AP06	Islamic Relief (NGO)
AP07	Crab Farm Association
AP08	Crab Depot
AP09	CARITAS (NGO)
AP10	BEDS (NGO)
AP11	SAMS (NGO)
AP12	DALIT (NGO)
***Actor category:* Mangrove Forest User**	
MU01	Honey Collectors
MU02	Boatman
MU03	Golpata Collectors
MU04	Tour Operators
MU05	Fishermen Group
MU06	Community People (Others)
MU07	Munda Community
MU08	Dalit Community

Figure 4. Power relational network based on exchange of (dis-)incentives as power instrument.

Note: Nodes are sized according to the degree of centrality, the larger the node, the more power elements are exchanged by the actor with other actors. Arrows indicated the direction of power providing actor towards receiving actor (AP = Association and Political Parties; GA = Government and Administration; MU = Mangrove forest Users; *detailed name of the all actors are mentioned in the bottom part of the figure*).

Figure 4 illustrates a very organized network on the financial resources representing hierarchical order of power distribution. We found the most two powerful actors in the incentives network are Ministry of Finance (GA17) and international donors (GA15), as these two actors act as the important sources of financial resources. Significantly, international donors support governmental actors through development projects (for example, SUFAL project[6]) which aim to the set program of the welfare of the nations. This assists forest dependent communities in creating alternative employment opportunities indirectly in one hand. On the other hand, international donors assist NGOs (AP actor) needed for field level implementation of operations, which helps employment generations of the local community directly. Following them, Palli Karma

[6] SUFAL (the Sustainable Forests and Livelihoods) is a World Bank financed development project (largest ever in forest sector in terms of estimated cost: USD 130 million approximately) for Bangladesh Forest Department to improve collaborative forest management and increase benefits for forest dependent communities

Sahayak Foundaion[7] (PKSF) (GA12) provides incentives to few actors of AP category. Ministry of Finance acts as the only one source of incentives towards other actors in GA category, whereas donors act as financial source for some of the actors both in GA and AP category. After receiving of the incentives, actors of AP category dispensed it towards mangrove forest user group actors. Hence, the network doesn't observe core powerful actors under AP category, who control the incentive resources. Among the mangrove forest user group actors, honey collectors (MU01), golpata[8] collectors (MU03), fishermen group (MU05) and other community people (MU06) receive incentives from maximum number of actor sources of AP category. In sum, the figure depicts here as the AP category act as intermedia role for distributing incentive power elements from GA category to MU category. Only an exception for the actor in AP category is crab depot (AP08), who distributes financial resources to the fishermen group (MU05) from their own sources.

5. DISCUSSION

5.1 Multilevel functionalities resulting power gain for bureaucratic actors

The analysis observed the asymmetrical distribution of relevant power elements, lead the national level state actors to mobilize these elements towards local level actors to obtain ultimate outcome in the sector of mangrove governance particularly. Hence, state actors showed their responsibilities shared and performed at best to govern mangrove policies. This phenomenon resembles the argument of power sources which come from resource distribution (Arts & Van Tatenhove 2004; Brass 1984). Moreover, the bureaucracy of Bangladesh still bears the legacy of British colonial rule, which has been hardly reformed in its working pattern, inherited structure, and normative and behavioral formations (similar to Haque, 1997; Mollah, 2011). Thus, the observation contradicted with the findings of Börzel and Heard-Laureote (2009), where top level bureaucratic actors tended to predominate in networks and only enjoyed indirect accountability in EU multilevel governance. Observed coercive and (dis-)incentives power network denoted positive development for the user level actors given the historical context of colonialism since this multilevel mangrove governance ensures delegation of authoritative and financial power, even if partial, from the top bureaucratic actors to the local actors. This supported the observations of Alcantara & Morden (2019), where MLG approach incorporating power relations was described as preferable for the indigenous communities in Canadian state. In addition, the observed coercive networks around the multiple level actors complied with the argument raised by Curry, (2015) that MLG as illustrative case fallen sometimes intuitively—even practically nonsensical and overlapping—also complementary power rules' relation by which the actors are governed. The power network on dominant information delineates more flexible (e.g., easily disseminating among actors) than that of coercive and (dis)incentives network which supported the idea of happening more chaotic and having questions of democratic legitimacy and accountability (Curry, 2015). However, the observed mechanism still following top-down approach of policy process in which dominant central powers not only controlled the organizational network, but also

[7] PKSF is a Bengali name that stands for 'Palli Karma Shahayok Foundation', and the full Bengali name can be translated into English as 'Rural Employment Support Foundation'. It is an apex development organization of the government of Bangladesh and its aim is sustainable poverty reduction through employment generation through NGOs' cooperation in the community level.

[8] Golpata is a local name of Nipa palm. The long, feathery leaves of the nipa palm are used by local people as roof material for thatched houses or dwellings. The leaves are also used in many types of basketry and thatching.

dictated policy goals and solutions—that differed from MLG (see, Homsy et al., 2019).

In the actors' network on dominant information power element, Forest Department hold the highest degree of centrality irrespective of any actor category. This got supported with the findings of Khan & Giessen (2021), as being responsible bureaucratic actor, Forest Department has the leading role in managing mangrove forest. Management of a sector needs expertise, sufficient knowledge and long experience. Though the Forest Department holds the largest node, it doesn't seem the strong position in exchanging dominant information as perceiving MLG, and actors at all levels participate with shared responsibility in policy decision making. Since Forest Department implements forest policies under the supervision of MoEFCC, according to Maryudi & Sahide (2017), the ministry supposed to have the highest degree of centrality in the power network. This phenomenon is absent and state agency—Forest Department holds the big role in power network in our analysis, whereas ministry acts as distinct actor in Indonesia (Prabowo et al., 2017). The findings are comparable to other relevant studies performed in Bangladesh's forestry sector (especially with forest biodiversity, forest climate change, community-based forest management, and sustainable forest management policies). This type of unclear institutional arrangements in mangrove governance of Indonesia were argued by Mursyid et al., (2021) where conflicting conceptions and development priorities were common. In dealing with all of these mentioned issues, Forest Department gained a higher level of incentives and dominant information power. Still, the MoEFCC achieved the highest level of coercive power as they undertook significant policy decisions (Rahman et al., 2016; Rahman & Giessen, 2017; Giessen, 2016; Sarker et al., 2017).

However, the study observed, the state actors at the top level along with Forest Department acted as the initial sources of all the three types of power resources in the multilevel mangrove governance. Significantly, stronger role of the national level state-actors for the (dis-)incentives power sources resembled with the findings of Crum (2018), where national level authorities hold the budgetary power illustrating European Union economic governance. Hence, apart from domestic state actors, donors shared important incentives through NGOs towards mangrove forest users' livelihood activities in mangrove governance. This observation supported with the findings of Burns et al. (2017), that along with governmental actors, the donor organizations' interventions contributed in reducing rural poverty in Armenia by means of improving natural resources management. In case of coercive and dominant information network, the national level state actors also hold the clear power setting over the actors from local level as these power elements dispersed from the national level. Still, the rule of law must exist and the actors with higher degrees must use the power resources to sanction, through maintaining their commitments to the goals of the framework. Hence, actors emphasize cross-cutting policy issues and multifunction of mangroves to uphold their desired position in the network for undertaking different policies, which may be explained as power gain in the policy process. To withstand the managing complexity of multilevel functionalities, the findings supported concluding hypothesis-i, as the state actors at the national level lead the mangrove governance based on coercion, information and incentives power elements.

5.2 Non-government organizations acting as bridging actors in power network

The study observed that the local level non-state actors (mostly NGOs) attempted to be intensely involved with the local level user group actors providing coercion, dominant information and (dis-)incentives power elements in operationalizing mangrove policies. Hence, NGOs' desire to prove the credibility in program implementation as well as profound local attachment which could receive further attention from the actors of

financial sources (e.g., Khan et al., 2021 in the case of microcredit business around the mangrove area in Bangladesh—for example). In the power network of (dis-)incentives, the study found that actors of local level non-state category were receiving financial resources both from the international donors and Ministry of Finance of national level state actors. Bebbington (2004) argued rightly that apart from national government, being local actors—NGOs were given priority for maintaining direct and strong relationships by the donors. In addition, NGOs acted as suitable agent for donors' agenda on-field implementation (Edwards & Hulme, 1996; Rahman et al., 2018). Haque (2002) rightly argued in his study as the NGOs were becoming powerful and influential, because of their donors' financial support, cooperation and advocacy, thus they became prominence in Bangladesh. To maintain the ecological balance of the Sundarbans, the actors of national level state category—the leading actors' motive is to create alternative income sources for the community people beyond the SMF's resources (Khan et al., 2021), and thus they provide financial resources to the local user groups through the NGOs. These phenomena resembled with the current study as NGOs were working as the intermedia role and gained power resources in the multilevel mangrove governance utilizing their physical presence around the local communities. The current study findings support the idea that international donors might provide financial assistance to the NGOs (who has better access to the field and communities) to gain access to the field and information in governing forest co-management policy in Bangladesh as stated by Rahman et al., (2018); however, the current study does not find any hint that the donors have exercised the power resources to control the whole implementation process. Arguably, local user groups are preferentially engaged in the forest management practices since their physical closeness generates better information of forest resources and local knowledge which necessarily determines the success of forest conservation (Agrawal & Yadama, 1997; Arnold, 1998; cf. Lund & Treue, 2008). The role of NGOs found accountable to the national level state actors only as NGOs are entrusted with coercive power but not accountable to the user actors as user groups could not affect NGOs' actions (similar to Börzel & Heard-Laureote, 2009). Thus, the study supported Mwangi and Wardell's (2012) argument of increasing complex interactions of forest resources' multilevel governance at various levels and institutions of state, private and social actors.

On the other hand, the study observed NGOs were acting in favor of government's agenda as they entailed with the power distribution of multilevel governance and involved with local community actors. Our study revealed mangrove forest's context in maintaining power relations for the NGOs both with the government and local people which supported the argument established as NGO-government relationships must be built on sector based comparative advantage (Coston, 1998). The organizational features of NGOs in the study suggested a mutual mechanism of exchanging power elements got established as intermedia between government and local communities, which strongly supported the findings of the case NGOs in Malawi and Zimbabwe with agricultural development (Mattocks & Steele, 1994). Hoole (2009) profoundly observed in his study that certain NGOs in Namibia evolved as bridging actors at national and regional levels mediating the international donors' contribution and legal requirements of the central government with local conservancy groups. On these contexts, local level non-state actors' proactive and participatory approaches to utilizing mangrove power resources delineated a unique position in providing feedback report and further dialogues with governmental actors experiencing from on-field policy implementation for the local user group actors' livelihood options. Thus, our study indicates the second hypothesis has been proven—local level non-state actors act as bridging role in

mangrove governance based on coercive, (dis-)incentives and dominant information power elements.

5.3 Power elements only imposed on user level actors

Our findings showed the dispersion of authoritative competencies and shared resources necessary for well-functioning of mangrove governance across multiple level of actors. Among user group actors, fishermen group showed bigger power network in terms of single profession which resembles the Getzner & Islam's (2013) finding that fishing observed the most prominent occupation of 67% of households in the Sundarbans area. Gnansounou et al., (2024) found plant and fish resources were mostly collected resources from mangroves of Benin Republic Network showing power elements across multiple actors revealed the national level state actors being empowered over local level actors in decision making. This phenomenon got similarity with the findings of Kaiser et al., (2008), as private actors were connected to lesser extent to make effective EU policies rather than network established among public actors in dispersing competencies and resources (Kleine, 2014). Representing power network of dominant information, we observed that this power resources were transmitted within the national level state actors— 'government and administration'. This horizontal type of exchanging informational power is absent in other actor categories of 'association and political parties' and 'mangrove forest user group'. Although, vertical exchange of the same power elements was observed across the three levels of actor category. This type of flexible structure revealed that local level user actors got the position down to other two groups for all the three types of power resources. Hence, observed power exchange denies that local information became part of the discourse in partnership with policy makers—state actors and thus missing of local level actors in policy creation process (similar arguments given by Corburn, 2009; Funtowicz & Ravetz, 1993; Homsy & Warner, 2013). As co-management is present in the SMF, local actors supposed to gain influence or power elements apparently in accordance with the concept of associating local peoples with its management (see Krott et al., 2014) and the co-management became strengthen itself with the positive role of the local community upon informational instrument—e.g., training, around the SMF (Begum et al., 2023). This argument was objected by this study as local level actors failed to gain power resources in mangrove MLG.

The study followed the absence of local level user group in the mainstream position with relevant power features as they only imposed by other actors. Another study of Zérah, (2009) sounded the same as the community people in Mumbai were end up on the losing side as the NGOs acted as contracted agents of the national actors representing the poor communities. He also argued that direct participation of local community would empower as becoming influential in the urban governance. Similarly, Espada & Kainer (2024) observed local community's needs and interests would be upholding when they were empowered in the case of Brazilian Amazonian community based projects. Marsland (2006) also emphasized the local actors' participation in the Tanzania's way of development in their power struggle. Elucidating power relationships between and among private, community and state actors, Hoole (2009) demonstrated some tangible success of ecotourism development in Namibia through community participation. In other words, scholars emphasized redistribution of power, staff and financial resources, and decentralization of administrative capacity to different territorial units of governance and various local actor groups to be counted for active participation of the local actor groups in the relevant multilevel governance (e.g., Capistrano & Colfer, 2005; Sahide et al., 2016; cf. Fatem et al., 2018). In our study, mangrove governance couldn't show enough authoritative power and other power

elements being dispersed and redistributed across different level of actors which recommended to address for any kind of development in natural resources sector. Based on aforementioned discussion, we disprove the third hypotheses that the local level user actors have substantial role in mangrove governance based on coercive, (dis)incentives and dominant information power elements.

5.4 Methodological challenges, limitations and future research options

Our study considered the Forest Department as a single actor regardless of this actor has offices in national, regional and local level. Since, this governmental actor has the same national interest/agenda towards implementing policies across the country with the offices at different administrative level, we conceptualized it as single actor in the analysis. This simplification of actor categorization was found similar with several studies, where Department of Forestry considered as single entity (see, for example—Brockhaus et al., 2012, Khan & Giessen, 2021; Mohammed & Inoue 2014, Schusser et al., 2015; Giessen et al., 2016, cf. Maryudi & Sahide, 2017). Moreover, this actor maintains power relation with other governmental actors of Ministry of Finance, Planning Commission—for example. Similarly, Department of Fisheries, Department of Livestock etc. were also considered as a single actor in the power network. To show the actors' power, we described the power resources provided from the concerned actors to be empowered in our study rather than receiving the same power elements. Moreover, displayed power network seems too complex with diversified size of nodes and direction of arrows. To figure the network more simplistic is obvious to understand the power relation dynamics of the whole system. Therefore, it would be worth if further study address if power gaining only depends on providing or also with receiving since both are important in building network relation. And receiving power elements also empower concerned actor or single actor category as they hold authority afterwards.

Our study didn't detect some governmental actors those supposed to be included in the power network analysis. These are the security agencies (for instance, Bangladesh Coast Guard, Border Guard Bangladesh etc.), those worked under the guidance of Ministry of Home Affairs and their operation happened with special instruction. Though they hold power position around the Sundarbans, their power elements related to the security issues and being threatened to the illegal activities. This would also raise an interesting question how these actors respond and collaborate with the forest bureaucracies in managing Sundarbans' resources in further research.

It was clearly observed from the study that the local level non-state actors are competing among each other as finite resources were available to support them for implementing relevant policies. For this reason, exchanging of power resources especially dominant information and (dis-)incentives were completely absent within the actors of association and political parties. Thus, this study demands how the competitiveness grows analyzing their on-field activities. Although, holding intermedia role between governmental and user actors, the NGOs' protest could be pivotal if a specific policy is pushed through by them. Thus, NGOs' position with upholding particular policy can be studied further if it gains power in any network. Finding NGOs or different associations act as organized interest groups (OIGs) evident with informal interests which are not always congruent with public interests (Laraswati et al., 2022), the sketched power network of this study requires further analysis if it affected by informal interests of the OIGs. Since the NGOs are likely to employ multiple strategies and tactics in their interactions with government (Ramanath & Ebrahim, 2010), the study demands new resource governance analysis to see the perspectives of the whole system dynamics of forest management where NGOs might not always form allies with government or user and their alliance might be highly contextualized on events and

issues or conflicting situation.

6. CONCLUSION

A large number of actors ranging from supranational level to local level are actively engaged with dispersed power for the policy tasks concentrated on the Sundarbans mangrove forest governance. At its core, multilevel mangrove governance observes potential power gain and loss across the actors derived from network analysis in terms of three different power elements—coercion, dominant information and (dis)incentives. Among the forest bureaucracies, the Forest Department holds the strongest position in terms of informational power which depicts this department earns relevant expertise and capacity in mangrove management. Regulatory aspects also empower government bureaucracies as usual. Importantly, international donors maintain significant power position in financial contribution along with Ministry of Finance, which helps keeping NGO-donor relationships at its merit. The NGOs' contribution in the multilevel mangrove governance delineated as forming allies both with the governmental and user actors in relating power resources where other actors failed to collaborating even if relating their interests. Assuming this context of coalition of actors at different level, it would be worthwhile to conduct further research to map out the driving interests and how they argue to keep individual power position in the mangrove governance.

Overall, the study contributes to a better understanding on multiple actors' power features and their relations which entails shared responsibility in governing policies applicable for the mangrove forest in Bangladesh. In the case of the Sundarbans, these actors include different local communities, non-governmental organizations and associations, as well as different state administrations at multiple levels which found very much consistent with the mangrove ecosystem. Holding intermedia role, NGOs have the important role redistributing power sharing among multiple actors. Since, state actors are responsible for balancing social, economic and environmental demands of the country's forests both in national and international arena (Maryudi, 2012; Mwangi & Wardell, 2012; Giessen & Krott, 2009; Sayer & Collins, 2012), the role of the state actors in sharing equitable stewardship and benefits is vital. It depicts state actor as the most powerful actor in mangrove governance yet it demands state actor to distribute power to multiple level of jurisdiction.

Author Contributions: Study design conceived and methodology developed by FK, AM and LG. Documents collection and analyses were done by FK. Hypotheses setting and data interpretation with study design from the case findings were done by FK and LG. Manuscript written by FK with the guidance of LG. Manuscript reviewed and verified by SR, AM and CS. Manuscript compiled and correspondence done by FK. Manuscript revised by FK. All authors contributed substantially.

Competing Interests: The authors declare no conflict of interest. The sponsors had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript, and in the decision to publish the results. The authors read and understood the journal's policies on copyright, ethics, etc., and believe that neither the manuscript nor the study violates any of these.

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APPENDICES

Appendix—A

List of actors detected in the study based on categories developed in Krott (2005).

Actor Category: Government and Administration

1. District Administration
2. Upazilla Administration/Council
3. Union Council
4. Forest Department
5. Fisheries Department
6. Livestock Department
7. Agriculture Department
8. Education Department
9. Health Department
10. Microfinance Regulatory Authority (MRA)
11. NGO Affairs Bureau
12. Palli Karma Sahayak Foundation[6] (PKSF)
13. Bangladesh Standards and Testing Institutions (BSTI)
14. Bangladesh Tourism Board (BTB)
15. International Donors
16. Ministry of Environment, Forests and Climate Change (MoEFCC)
17. Ministry of Finance
18. Planning Commission
19. Implementation Monitoring and Evaluation Division (IMED)
20. Economic Relations Division (ERD)
21. Department of Environment

Actor Category: Association and Political Parties

1. Sushilan
2. Bangladesh Rural Advancement Committee (BRAC)
3. Centre of Zakat Management (CZM)
4. Nowabenki Gonomukhi Foundation (NGF)
5. Christian Commission for Development in Bangladesh (CCDB)
6. Islamic Relief
7. Crab Farm Association
8. Crab Depot
9. CARITAS Bangladesh
10. Bangladesh Environment Development Society (BEDS)
11. Sundarbans Adibashi Munda Sangstha (SAMS)
12. Dalit

Actor Category: Mangrove Forest Users

1. Honey Collectors
2. Boatmen
3. Golpata Collectors
4. Tour Operators
5. Fishermen Group
6. Community People (Others)
7. Munda Community
8. Dalit Community

Appendix—B

Power elements with their observable facts and contextual boundaries used for data collection

Power Elements	Observable Facts	Contextual Boundaries	Example
Coercion	Physical action, threat for physical action or sources for physical action	- Approval for establishment of the concerned actors - Permission for launching a program - Threatening with operating a program - Possibility of hindrance to the activities - Threat for punishment	Permission for operating microcredit
Dominant information	Providing of, or threat with, sources of unverified information	- Providing of the related information - Sharing of research/field experiences - Sharing of technical knowledge - Sources of rules/regulations/guidelines	Training for the biodiversity conservation
(Dis-)incentives	Providing of, or threat with, sources of material or immaterial benefit	- Providing of the financial supports - Sanction for promotion or upgradation - Sources of office or organizational support - Sources for material support for the operational program	Financial support for creating alternative income generating activities of the local people

Source: Adapted from Krott et al. (2014), Rahman et al. (2016)

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