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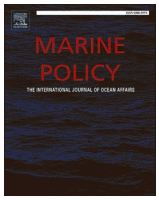

Full length article

Stakeholder perceptions of blue economy governance networks and their equity implications in Bangladesh

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ABSTRACT

The 'Ocean Decade' focuses on ocean governance and management including ocean health and human well-being in line with the Sustainable Development Goals. Here, we use participatory network mapping to investigate perceptions of Blue Economy governance networks in Bangladesh. Representatives of four Blue Economy stakeholder categories (government, researchers, private sector and civil society, and non-governmental organizations) mapped who they perceived as Blue Economy actors and the relationships between these actors. The resulting "netmaps" highlight 83 actors and diverse perceptions of the composition, structure and dynamic of Blue Economy governance. Relations between governance actors were categorized as formal command, information and support, funding, and competition or obstruction. Information and support, followed by funding were the most frequently perceived Blue Economy governance interactions. The centrality and influence of government actors at different levels, the role of international agencies, and the marginalization of coastal resource users and communities emerged as key themes. A narrow view of the Blue Economy was found; this focused on fisheries, tourism, and shipping sectors indicating a risk of non-inclusive development. We find that Bangladesh's Blue Economy governance needs to be more inclusive, collaborative, and decentralized and mainstream marginal actors, while carefully considering international actors' motivations, roles and influence. We propose 'blue equity' to guide a holistic approach to Blue Economy governance which aims for a 'Community of Practice on Blue Economy Governance'. In Bangladesh, such a policy shift requires an effective Blue Economy Cell of the Government that supports knowledge and capacity building, innovative financing, and research-guided policy.

1. Introduction

The concept of Blue Economy, often used interchangeably with the term Blue Growth, relates to a wide range of activities on the coast and in the sea. Despite the interchangeable use of terms, there is a growing push to delineate the two concepts within the science and policy context [113]. The Blue Economy includes a broader set of social, environmental, and governance considerations aiming to promote sustainable use and conservation of marine resources. On the other hand, Blue Growth is primarily focused on the economic expansion of the ocean-based industries. The Blue Economy (hereafter BE) generates a global annual income of approximately US$ 2.5 trillion and supports the livelihoods of billions depending on the ocean [91]. While many countries have embraced BE initiatives to expand their economic growth [116], their coastal and marine ecosystems face threats such as over-exploitation, pollution, habitat destruction, and climate change [32]. Amidst these challenges, the discourses surrounding the BE are often in conflict to ensure the balance between economy and sustainable development along with social and environmental justice [14,17,42,75]. This economically driven attention toward oceans demands improved regulations [57], innovative governance [26], an understanding of actor dynamics and relationships [28], and enhanced collaborations among

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governments, civil society, epistemic community, and private sectors [64,92], all within the broader framework of blue economy governance (hereafter BE Governance) [63]. We understand 'BE Governance' as formal, informal, political and institutional processes that affect social-ecological outcomes relating to the ocean-based economy. Identifying the most appropriate and practical governance approach to support a sustainable BE, referring to its long-term viability and the health of marine ecosystems, in line with the Sustainable Development Goals (SDGs) is important but challenging in both national and global contexts [30,31,75,112]. In the context of a holistic understanding of sustainability, inclusivity and equity in the BE and related governance processes, the complexities and implications of these three aspects are often debated [113]. Inclusivity is crucial for ensuring equitable access to the benefits and decision-making processes of BE, particularly for marginalized coastal communities [117]. Equity encompasses the fair distribution of resources, opportunities, and benefits of BE [54]. Ensuring equity and inclusivity in BE involves engaging diverse stakeholders and recognizing their values, knowledge systems, and voices in BE governance [35]. In the past decade, rapid changes in BE governance marked by newly emerging economic uses, increased demand for stakeholder engagement, and implementation of new policies have been witnessed in the Global North [60]. However, it is important to highlight that the meaning of BE at the national policymaking level remains inadequately explored in a number of countries, especially in the Global South [37,99]. At a national level, the resilience and sustainability of BE often depend more on socioeconomic and governance mechanisms than on resource availability [30]. Therefore, before contemplating a global governance structure to advance BE [121], it is important to align local realities with global expectations, which necessitate national-level reforms in BE governance tailored to the regional contexts [17,37].

1.1. Why network perception matters for Blue Economy governance

Perception has been defined as "*the subjective way people experience, and think about, and understand someone or something*" ([19], p. 4). In the context of environmental conservation, [13] adds that "*perceptions are one type of information that is often dismissed as anecdotal by those arguing for evidence-based conservation*." This argument highlights the general disregard for using subjective viewpoints in the analysis of social phenomena in fields that prioritize evidence-based approaches. However, there is a growing scientific acknowledgment that perception matters and that its investigation produces evidence that is central to understanding the complexity of natural resource management [13,36,54,73]. Engaging stakeholders' perceptions supports inclusion that could lead to more effective decision-making, management, and the sustainable use of coastal and marine resources [54,65].

There is a clear link between coastal actors' social network connectivity and their ability to adapt through innovations [78]. BE governance networks may include a diverse array of stakeholders, including government, non-government, academic, research, private sector, and civil society [53,90]. While policymakers and decision-makers are directly involved in formulating and implementing the BE governance processes, other actor groups often have significant influence on the related governance processes [112]. Understanding how these stakeholders perceive the position and role of diverse governance actors and their interactions is crucial for enhanced and transformed governance planning in the future [55].

Robust knowledge of an actor's perceptions is likely to throw light on the behavior of that actor within a governance system [39,96]. Knowledge of BE actor dynamics could enable sustainable niche innovations in ocean systems including integrated multi-trophic aquaculture [41], coastal and ocean-based renewable energy [81], and maritime recycling [38] that require stakeholder alliances and co-developed solutions [25,26]. Hence, engaging the BE actors, their values, and images associated with the BE social network could broaden our view on the organization of its governance [48,52] and re-politicization of the associated decision-making processes [100].

1.2. Blue economy in Bangladesh: a case study from the Global South

The South Asian Association for Regional Cooperation (SAARC)[1] nations aim to establish and develop a comprehensive BE to drive economic progress within the region [7]. Bangladesh with its vast marine expanse of approximately 118,813 km^2, as defined in the recent resolutions governing maritime boundaries with India and Myanmar, stands as one of the front runners of BE development in the Global South [71]. Marine and coastal ecosystems play a vital role in sustaining livelihoods and generating income for approximately 36 million residents in Bangladesh [70]. As one of the most climate-vulnerable countries on earth, Bangladesh's coastal communities face threats of rising sea levels [94], natural calamities [95], local population growth, and economic pressure [89]. Moreover, Bangladesh's geopolitical position, surrounded by India [79], along with the increasing involvement of China [3] influence its development. In response to these challenges, the BE concept has gained traction in Bangladesh in the last decade as evidenced by its inclusion in the national 7th and 8th Five-Year Plans of Bangladesh [50,51].

To coordinate the BE development, the Government of Bangladesh established the Blue Economy Cell (BEC) to focus on diverse sectors including, marine fisheries, commercial shipping, coastal and marine tourism, coastal infrastructure development, offshore and renewable energy, shipbuilding and recycling industries, among many others [45,86]. Additionally, industrial growth in coastal areas is increasing, including large-scale power plants, deep sea ports, and liquefied petroleum gas (LPG) and liquefied natural gas (LNG) terminals [50,70]. However, for effective BE governance, blue diplomacy within international cooperation [69] and ocean governance strategies that involve changes in policies and associated regulatory frameworks are needed [97]. Consultations with the selected BE stakeholders have already been undertaken resulting in the development of sectoral maps to guide future initiatives in the country [66,85]. Moving forward, effective integration and collaboration among BE stakeholders is essential for the implementation of inclusive BE policies [117]. With this background, this study investigated how key BE actors in Bangladesh perceive the BE governance network and the interactions between them. By exploring stakeholder perceptions of their network dynamics, we aim to identify strategic and practical points of leverage [83] within these perceptions of BE governance to inform future policy and decision-making. Specifically, this study examined the following research questions:

1) How do different BE stakeholder groups in Bangladesh perceive the roles and influences of BE governance actors?
2) What are the perceived link-specific networks among BE actors in Bangladesh?
3) How can insights on the BE stakeholder perceptions support the development of actions for inclusive and sustainable BE governance in Bangladesh?

2. Methodology

In order to address the complexity of BE governance and to understand and drive sustainability along with social and ecological equity, innovative, interdisciplinary and transdisciplinary approaches are required [57,93,110]. This research uses the Net-Map tool, a qualitative approach that can effectively contextualize, visualize, and analyze stakeholders' perceptions of social and institutional networks [1,61,62,98]. The participatory approach facilitates discussion and deliberation among respondents to identify the roles, relationships, and power

[1] South Asian Association for Regional Cooperation (SAARC), which was established in 1985, currently with eight member countries, namely Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka

dynamics of actors who can influence decision outcomes within a governance system [54,55,78]. By linking actors and their action situations, netmapping helps to identify the strengths and gaps within a governance system from a network perspective to inform decision-making [4]. While the social network approach offers valuable insights into environmental governance [21], the application of social network analysis approaches such as Net-Map, is still rare in the Asian context [122].

2.1. Data collection, analysis, and interpretation

The participatory network mapping (Net-Map) technique allows a group of respondents to co-create visualizations of social networks based on their collective knowledge and perceptions [98]. Data collection was undertaken in October 2022 during the 5th CSD Annual Conference on Sustainable Development 2022[2] in Dhaka, Bangladesh. We proceeded in seven steps.

2.2. Step 1 – literature review and expert knowledge gathering

We conducted a literature review to identify stakeholders involved in various sectors of the BE in Bangladesh. Relying on the local knowledge of the authors and through expert consultations, the literature-derived list of stakeholders was then reviewed and complemented. A list of 48 BE governance actors was compiled through expert consultations.

2.3. Step 2 – selection and invitation of netmapping participants

Relying on this list, individuals, institutions and organizations representing government, non-government, private sector, civil society, and research and academic stakeholder groups were invited. Private sector participants included representatives of key BE sectors (fisheries, shipping, and tourism) identified in the previous literature [94,97]. The civil society respondents included environmental activists and individual consultants who work in national policy development and dialogues. Of the 48 invited parties, 38 individuals participated (response rate 79.2 %).

2.4. Step 3 – plenary briefing

At the onset of the netmapping exercise, an explanatory briefing was delivered. Participants were then grouped into four stakeholder groups (Government, NGOs, Private Sector and Civil Society, and Researcher). Each group (hereafter called "netmapping groups" or "netmappers") was assigned a separate table and accompanied by a facilitator. Facilitators were also tasked with participatory observation [18], witnessing the discussions, thoughts, and notes. They also clarified any arising questions for their group.

2.5. Step 4 – list blue economy actors

Each netmapping group table was asked to list the actors they considered to be involved in the BE of Bangladesh. The prompting question we used was: *Who has an influence or who is influenced by blue economy governance in Bangladesh?* The acronym or name that identified the actor institution was written on sticky paper (post-it note) and placed on a large sheet of paper. Post-it notes were color-coded according to actor type (yellow: government, pink: non-government, gray: research institutes, and orange: private sector and civil society).

2.6. Step 5 – identify and draw links/connections between blue economy actors

Participants were then asked to pinpoint and draw the connections between their identified actors based on the type of relationship between the stakeholders. Adopting Schiffer & Hauck's [98] suggested link types, participants then drew color-coded lines between actor labels to represent relationship type (green: formal command, blue: information and support, black: funding, and red: competition/obstruction). These lines were arrowed as one-way or both-way to signify the direction of the relationship. Netmappers were asked to rank the level of influence of each actor in the mapped network on a scale from 0 (least) to 10 (most). We defined influence in terms of how much decision-making capacity and power an actor has in the specific 'BE governance' arena in Bangladesh.

2.7. Step 6 – data processing

A short narrative on the netmapping session by the group facilitators was compiled soon after the session. In this, facilitators provided their impression on group dynamics (e.g. leadership, the most heard voices, strengths and weaknesses of the exercise) and other observations from their table. Collected netmapping data was digitalized, visualized, and rechecked with hand-drawn netmaps. The networks were plotted and visualized using Gephi (version 0.10) [10]. Stakeholder-specific netmaps were created. In line with network analysis conventions, the network visualizations consist of 'nodes' (colored circles) representing the stakeholders (or 'actors'). The nodes are connected by 'edges' (colored arrows) representing the directional relationship between the stakeholders. Network-level metrics were calculated and link-specific networks were plotted and visualized for each stakeholder group's network perspective.

2.8. Step 7 – network visualization and analysis

The digitalized Net-Map data were presented and discussed in a week-long block seminar held at the University of Bremen, Germany entitled "Ocean and coastal conflicts, their origins, trajectories, and management". The participants of this seminar were graduate students of ecology, geography, international relations, and political science. They analyzed and interpreted the perceived networks. Their 'fresh thoughts' as completely uninvolved outsiders added new interpretations and perspectives to the analysis of our Net-Map data.

2.9. Constraints and limitations

One clear limitation of this study was that we were unable to directly engage coastal communities as stakeholder representatives in the netmapping session. A variety of factors contributed to this: the character of communication in Bangladesh is generally hierarchical and, more often than not, prevents those in lower positions in the social hierarchy from giving their opinions in the presence of "seniors". That our netmapping session took place in English and at an international conference in the national capital also created additional costs, travel logistics and language barriers that worked against the inclusion of small-scale ecosystem users such as fishers, farmers or laborers. While the international conference setting was needed to attract the ministerial-level BE stakeholders we would otherwise not have had access to, it also obstructed the inclusion of local coastal and marine stakeholders. Complementary work ([58], in preparation) was therefore undertaken to investigate the BE governance perceptions of poorer and marginalized coastal and marine ecosystem users.

[2] This Conference (https://csd.ulab.edu.bd/csd-conferences/2022) is an interdisciplinary and transdisciplinary event, annually organized by the Center for Sustainable Development (CSD) - the University of Liberal Arts Bangladesh (ULAB), to take local and international experts together from across the globe to explore the most pressing and nexus issues relating to the sustainable development agenda. Our netmapping exercise was a 2.5-hour session of this conference on October 15, 2022.

Our approach, described above, faced challenges. Conflicting interests and cognitive biases among netmapping participants, operating at different levels of BE governance, might have affected the data [19,23,27]. According to the facilitators, hierarchical structures and power differences also played a role in decision-making at the netmapping tables. At times, but not always, participants seemed hesitant to pinpoint conflicts or competition in the link-specific networks. Moreover, as not uncommon in netmapping exercises [54], participants sometimes struggled and argued to establish their network perception as 'correct' [61]. Our approach, however, was not to reveal an 'objective reality' but to identify the diversity of perceptions of the BE governance realm in order to investigate how the diversity of their governance perception drives governance-relevant behavior(s).

One of the netmapping groups (private sector and civil society) was composed of a mixed membership with possibly varying perceptions between the two components of its membership. This netmapping group was composed as it was due to the availability of few representatives of either group as well as to the availability of only four facilitators.

3. Results

Our results are visualized in 20 netmaps. Figs. 1–5 highlight the different perceptions held by some major governance actors, of Bangladesh's BE networks. A total of 83 actors representing government, NGOs, donors, private sector and civil society, and research actors were identified by the participants during the four stakeholder-specific netmapping exercises conducted. Table 1 lists the numbers of identified actors by stakeholder group, most frequently mentioned actors, high and low influence actors, actors with a bridging role, actors who contribute to information sharing and support, and isolated actors.

3.1. Government representatives' perceptions (Fig. 1a)

Representatives of ministries dealing with foreign affairs, fisheries and livestock, power, energy, and mineral resources, the Department of Fisheries, and the Bangladesh Navy worked at this table. Government netmappers saw a centralized network between government actors with links to some but not all identified actors from other (i.e., NGO, research, and private sector/civil society) groups. National government netmappers identified government actors from the national level (ministries), while provincial/district or regional level government actors did not appear in their network perception. In line with the views of the top-ranking member of the government netmapping group, this netmap presented the Blue Economy Cell (BEC) within the Prime Minister's Office as the apex governing body of BE matters with official authority over all other government bodies. This is further supported by the allocation of the highest influence to BEC among all government actors. They self-reported a high level of exchange of information and support between government actors, while they saw little such exchange between government actors and other actor types. Government netmappers considered universities as critical for mediating the transfer of research knowledge to decision-makers. This netmap portrays external funding from external (non-national) donors as focused on the fisheries sector of Bangladesh and it does not portray conflictive relations among BE governance actors. Despite appearing as isolated actors in the government netmap, government netmappers considered private sector actors as highly influential in BE governance and decision-making.

3.2. Researchers' perceptions (Fig. 1b)

This stakeholder table had researchers from public and private universities and research institutions. The group generated a decentralized network with stakeholders from local to national levels. The government was well represented, with other actor types, such as research institutes and non-government organizations, also well integrated into the overall network. Researchers saw the Bangladesh Space Research and Remote Sensing Organization (SPARSSO) as the most influential stakeholder in BE governance. Multiple stakeholders including various other government actors and foreign donor agencies were seen to have a high level of influence. The researchers regarded the Ministry of Shipping (MS) as the main governing body of the BE, and international development agencies as important funders. The researchers also considered fishing communities to have a high influence, interpreted as receiving knowledge for BE-related research. The shipping and maritime transport sectors and the related actors are important in this network. Competitive/obstructive links between a few national-level governing bodies were perceived. A link between the Bangladesh Tourism Board (BTB) and the country's ship-breaking industries (SBI) indicates a conflict between the tourism and ship recycling sectors. The researchers' BE netmap also shows four completely unconnected government actors.

3.3. Private sector and civil society's perceptions (Fig. 1c)

The participants in this netmapping group included BE entrepreneurs and environmental and social activists. Their view of the BE governance network of Bangladesh is characterized by a few distinct polycentric networks with specific link types controlled by critical brokers. They perceived a decentralized flow of information and support between actors with Blue Economy Cell (BEC) and Bangabandhu Sheikh Mujibur Rahman Maritime University (BSMRMU) portrayed as important brokers for knowledge exchange. A dense funding network between international donors and the government is perceived. This international funding is seen to support research, environmental activism, and tourism in the BE in Bangladesh. The Ministry of Power, Energy, and Mineral Resources (MPEMR), Ministry of Fisheries and Livestock (MoFL), and Ministry of Foreign Affairs (MoFA) are considered the most influential BE stakeholders. This netmapping group saw themselves as isolated or/and marginalized from the core BE governance network and less influential than government stakeholders. The private sector netmapping group identified a role for community-level actors (e.g. fishermen) in knowledge exchange but considered them least influential in governance and decision-making. This group also saw several conflicts and obstructive relationships between environmental activists on one side and the ministry responsible for power and energy management in Bangladesh, ship-breaking industries (SBI) and the tourism sector (TS), on the other side.

3.4. Non-government organizations' perceptions (Fig. 1d)

This netmapping table had participants representing national and international NGOs. They saw a bifurcated, but centralized network with a high number of actors without links to the well-connected main network. They self-reported non-government organizations to be the dominant actors followed by government actors and they considered the World Bank as the most influential actor in the BE of Bangladesh. Research actors are considered influential despite being isolated from the main network. NGO netmappers saw the very clear gap between government agencies and non-government organizations highlighted by the absence of support and knowledge exchange links between them. However, they consider the Ministry of Environment, Forest, and Climate Change (MEFCC) to be a very important gatekeeper between government and non-government actor communities. They also perceived NGO actors, such as the Centre for Policy Dialogue (CPD), private sector and civil society actors, such as the International Centre for Climate Change and Development (ICCCAD), and Bangladesh Environmental Lawyers Association (BELA) as the major sources of knowledge generation for the BE in Bangladesh. This netmap contains a high number of perceived obstructive or competitive links between international actors, NGOs, and private sector actors, and no supportive links between the national government and national NGOs were pointed out. Private companies related to tourism, banking, fisheries, and shipping were seen to be isolated and least influential.

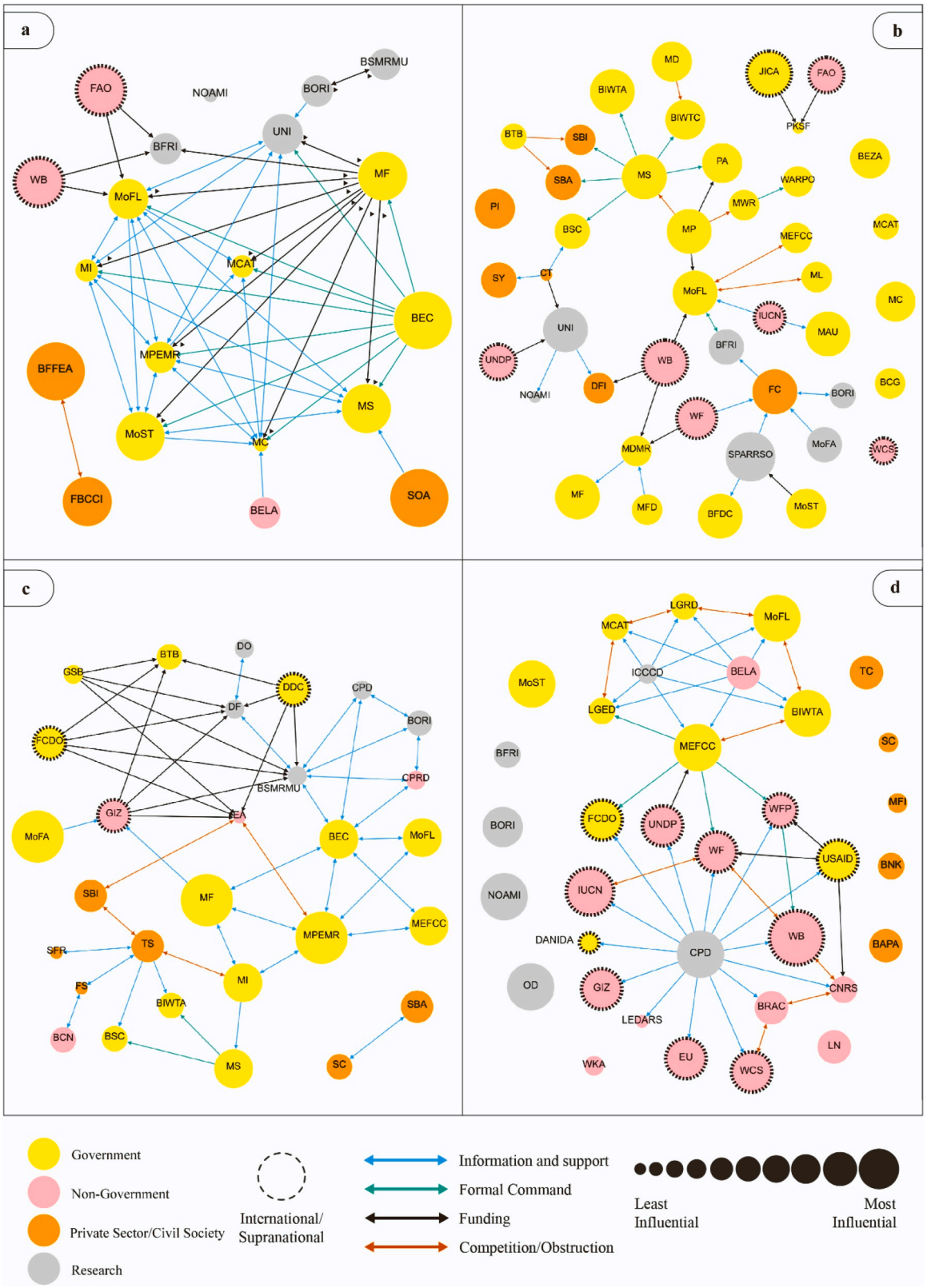

Fig. 1. Blue economy governance networks in Bangladesh as perceived by different stakeholder groups. (a) Government representatives' perception, (b) Researchers' perception, (c) Private sector and civil society's perceptions, and (d) Non-government organizations' perception. An acronym explanation is provided in Supplementary Information.

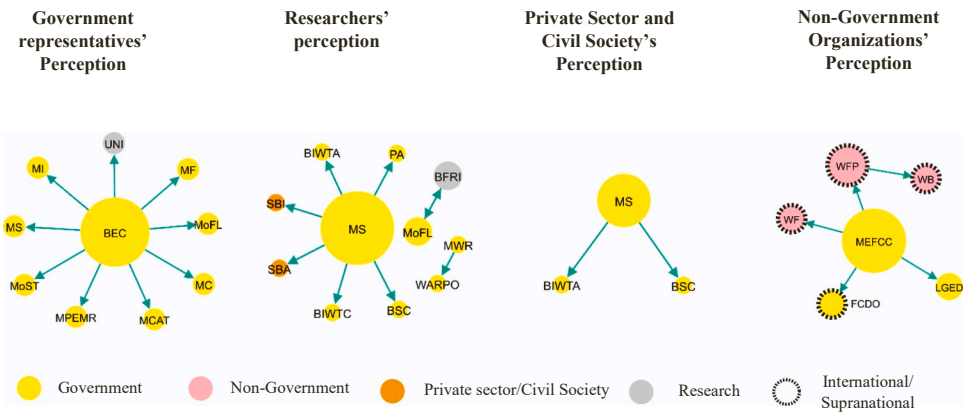

Fig. 2. Formal command relationship perceived by the different stakeholder groups.

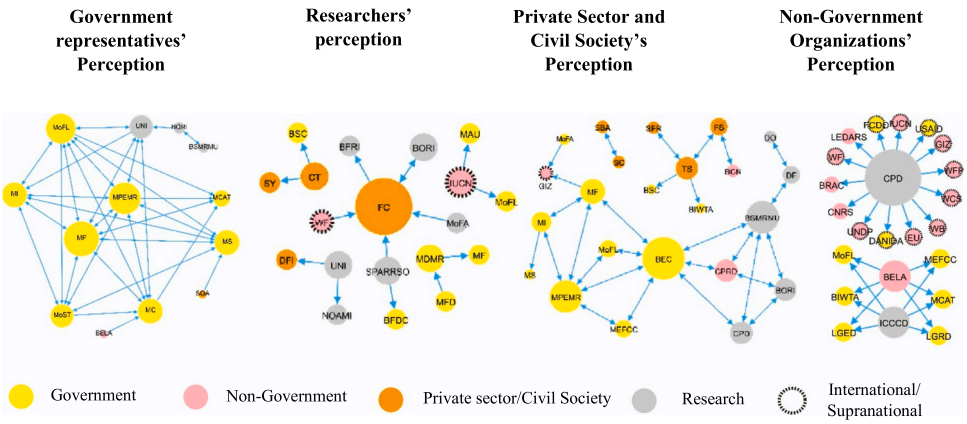

Fig. 3. Information and support relationships perceived by the different stakeholder groups.

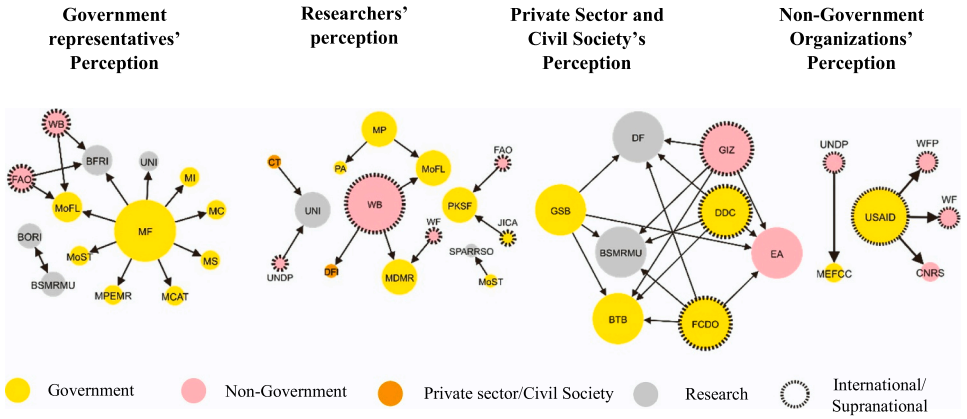

Fig. 4. Funding relationships perceived by the different stakeholder groups.

3.5. *Link-specific network perceptions*

Here we present the stakeholder-specific views of different link types in Bangladesh's BE governance.

3.5.1. *Formal command*

The formal command link (Fig. 2) represents the authoritative or administrative power of an actor over another in BE-related governance and development. Government actors from the national level were seen to be the major commanding authorities of the BE of Bangladesh by all netmapping groups. But strikingly, the national government is both the major source and recipient of formal command links, while national NGOs were not portrayed as subject to any formal command link by any of the netmapping groups. Government stakeholders perceived BEC as the main source of formal command over both ministries and universities. Researchers and private/civil society stakeholders highlighted the importance of the MS authority over public and private actors in maritime sectors, such as ship manufacturing/recycling, shipping, and transportation. NGO netmappers perceived the MEFCC to be guiding international donors and Local Government and Rural Development (LGRD) through formal command.

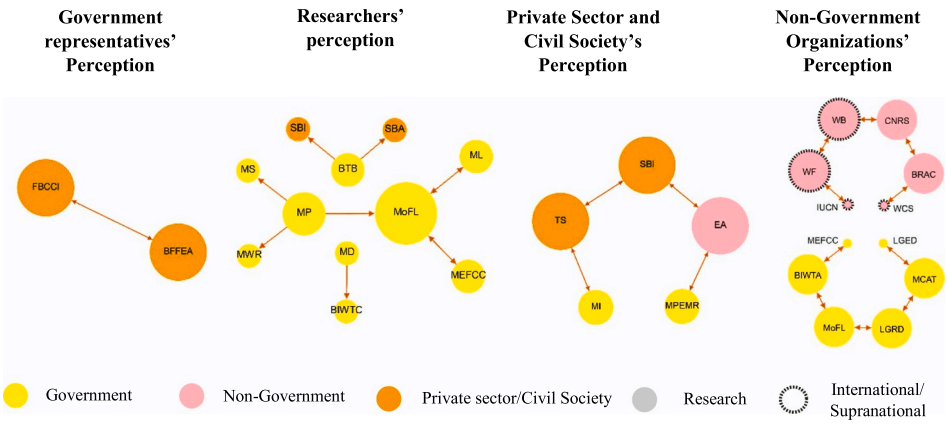

Fig. 5. Competition and obstruction relationships perceived by the different stakeholder groups.

3.5.2. *Information and support*

The information and support link (Fig. 3) expresses the knowledge sharing and service provision concerning BE-related endeavors. The members of the government netmapping table perceived a fairly dense network of knowledge and service exchange between government bodies but minimally extending to and from researchers, private sector and civil society, and NGOs. Although all reported information and support relations between government agencies, the remaining three stakeholder groups do not share the government group's perception of a strong information and support link network between government actors. Researchers, the private sector and civil society, and NGOs perceive information and support networks as fragmented into smaller isolated parts with a few actors each. Moreover, the four netmaps of support and information links highlight multiple different actors as critical information providers and mediators. The government stakeholders reported that energy and fisheries-related ministries are critical actors for knowledge and service exchange within the Government realm. The researchers felt that the local fishing communities play a central role in receiving and exchanging knowledge. Private sector stakeholders saw BEC as holding a very important bridging position between government and researchers. The non-government netmapping group saw CPD, BELA, and ICCCAD as the only providers of information and support for multiple government and non-government actors.

3.5.3. *Funding*

The funding link (Fig. 4) represents the financial support between actors for BE-related purposes. All four netmaps of funding links highlighted a key role of international/supranational actors in funding the BE actors of Bangladesh. In the government netmap, the Ministry of Finance is a critical distributor of public money to various ministries for BE development in diverse sectors. The researchers considered the World Bank as a central donor along with a few other slightly less central international funders and investors, such as JICA, UNDP, and FAO. Funding is seen to be mostly directed toward fisheries-related actors, universities, port authorities, and rural-based developmental programs/entities (e.g., PKSF). The private sector and civil society stakeholders saw a well-connected funding network formed by a few international donors supporting research institutes, tourism board, and environmental activists, but did not mention any funding sources for their stakeholder group. USAID and UNDP are considered important funders by non-government groups of netmappers. Overall, the different perceptions on funding suggest that most financial support is focused on diverse actors of the fisheries sector followed by the funding directed towards research institutes for BE development. Funding of private sector BE ventures did not appear in the netmaps.

3.5.4. *Obstruction/Competition*

Perceptions of competition and conflict (Fig. 5) varied greatly between netmapping groups. Government netmappers reported a negative relationship between two trade and business-related private associations. The other three netmaps highlighted numerous conflictive links between diverse BE governance actors. The perceptions of research and non-government stakeholders challenge the government's viewpoint by highlighting multiple competition and obstructive links between government actors. The presence of competition and obstruction between the tourism and shipping sectors is indicated in the researchers' and private sector/civil society points of view. The latter also mapped competing interests between environmental activists and government actors related to power/energy and private ship recycling industries. Finally, the NGO netmappers perceived conflicting and competitive relationships within separate government and non-government actor communities.

3.6. *Shared perceptions*

The perceptions of the BE network of Bangladesh by different stakeholder groups exhibit similarities and differences in terms of composition (actors and links), structure, and dynamics (Fig. 1). The total number of actors identified in each perceived network ranges between 20 and 44 (Fig. 6). Although government actors are highly represented in all netmaps, government is seen to act at different governance system levels. In the government representatives' netmap, government actors are identified only at the national level while other three netmapping groups see government actors at regional, national, and international levels. Their shared opinion was that government and international actors have more influence in BE governance and decision-making in Bangladesh than actors from non-government, civil society, private sector, and research. International NGOs were seen as critical donors by all netmapping groups while private sector/civil society actors related to tourism, shipping, and fish trade industries were seen as marginal and not well integrated in all four netmaps. Local communities and resource users are least represented or absent in all mapped networks. Two collective actors, the fishing communities (FC) and fishermen (FS), both representing small-scale and industrial fishers and the associated communities, are part of researchers' and private sectors' and civil society's perceived BE governance realms. Government and non-government netmaps, however, did not include any community actors in their perceptions of BE governance networks. Competing interests and conflicting opinions were identified by all participants within the government realms, with the exception of the government netmappers themselves. Furthermore, similar links were also observed between actors in the tourism and shipping sectors by the private sector and civil society netmappers. The participant groups perceived 'information and support' as the most frequent link (Fig. 7) among BE governance stakeholders in Bangladesh. The funding link is considered to be the second most frequent link by all netmapping groups except the non-government netmappers.

Table 1
Blue Economy governance actors in Bangladesh identified by four specific stakeholder groups.

Criteria	Government representatives' perception	Researchers' perception	Private sector and civil society's perception	Non-government organizations' perception
Total	**20**	**44**	**29**	**35**
Government actors	9	26	14	10
Researcher actors	5	5	5	6
Private sector and civil society actors	3	7	6	4
NGO actors	3	6	4	15
Frequently mentioned actors	Ministry of Fisheries and Livestock (MoFL, 4), World Bank (WB, 3)			
High influence actors	Blue Economy Cell (BEC, 10), Bangladesh Frozen Foods Exporters Association (BFFEA, 10), Ship Owners Association (SOA, 10)	Bangladesh Space Research and Remote Sensing Organization (SPARRSO, 10)	Ministry of Power, Energy, and Mineral Resources (MPEMR, 9), Ministry of Foreign Affairs (MoFA, 9), Ministry of Finance (MF, 9)	World Bank (WB, 9)
Low influence actors	National Oceanographic and Maritime Institute (NOAMI, 5), Ministry of Commerce (MC, 5)	Celestial Technology Ltd. (CT, 2), National Oceanographic and Maritime Institute (NOAMI, 2), Palli Karma Sahayak Foundation (PKSF, 2)	Environmental Activists (EA, 3), Sea Food Restaurants (SFR, 3), Fishermen (FS, 3)	Local Environment Development and Agricultural Research Society (LEDARS, 3)
Bridging actors	Ministry of Fisheries and Livestock (MoFL), Universities (Uni)	Ministry of Fisheries and Livestock (MoFL), Fishing Communities (FC), Bangladesh Fisheries Research Institute (BFRI)	Blue Economy Cell (BEC), Tourism Sector (TS), Ministry of Industries (MI), Ministry of Power, Energy, and Mineral Resources (MPEMR)	Ministry of Environment, Forest, and Climate Change (MEFCC)
Information and support hub	Blue Economy Cell (BEC), Ministry of Power, Energy, and Mineral Resources (MPEMR), Ministry of Fisheries and Livestock (MoFL)	Ministry of Shipping (MS), Fishing Communities (FC)	Blue Economy Cell (BEC), Bangabandhu Sheikh Mujibur Rahman Maritime University (BSMRMU)	Centre for Policy Dialogue (CPD), International Centre for Climate Change and Development (ICCCAD)
Isolated actors	National Oceanographic and Maritime Institute (NOAMI)	Wildlife Conservation Society (WCS), Bangladesh Coast Guard (BCG), Ministry of Commerce (MC), Ministry of Civil Aviation and Tourism (MCAT), Bangladesh Economic Zones Authority (BEZA)		Tourism Company (TC), Shipping Company (SC), Microfinance Institutes (MFI), Bank (BNK), Bangladesh Poribesh Andolon (BAPA), Local NGOs (LN), WaterKeeper Alliance (WKA), Oceanographic Departments (OD), National Oceanographic and Maritime Institute (NOAMI), Bangladesh Oceanographic Research Institute (BORI), Bangladesh Fisheries Research Institute (BFRI), Ministry of Science and Technology (MoST)

Note: Influence was assigned on a scale of 0–10 (low to high)

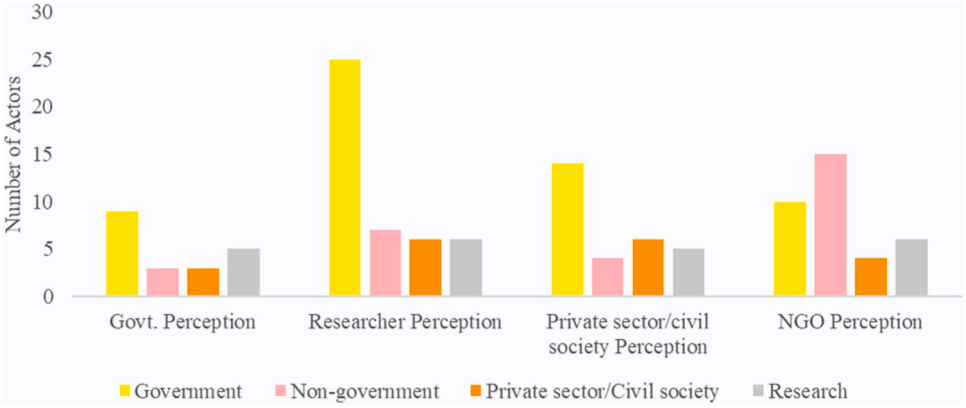

Fig. 6. Number of blue economy actors perceived by different stakeholder groups.

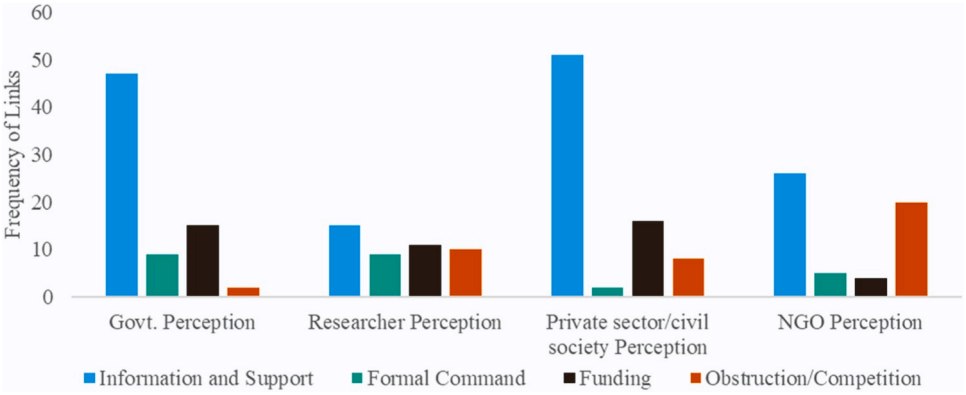

Fig. 7. Frequency of link types perceived by different stakeholder groups.

4. Discussion

4.1. Narrow and dysfunctional view of Blue Economy in Bangladesh

In Bangladesh, major BE actors conceptualize oceans and seas as 'Development Spaces' where spatial planning integrates conservation, sustainable use of living resources, oil and mineral wealth extraction, bio-prospecting, sustainable energy production, and marine transport [94]. This BE approach is founded upon the assessment and incorporation of an unweighted monetary value of the natural (blue) capital related to all economic activity. The BE requires a balanced approach between conservation, development, and utilization of marine and coastal ecosystems, all ocean resources and services to generate employment, secure a productive marine economy, and healthy marine ecosystems [50,51,94]. The recent Blue Economy Development Work Plan by the Ministry of Foreign Affairs in Bangladesh (*Sunil Orthoniti Unnayan Porikolpona* in Bengali) focuses on nine sectors (marine fisheries, mariculture, commercial shipping, marine tourism, offshore energy, renewable energy, blue biotechnologies, ecosystem services of mangroves, ship-building, and recycling industries, marine pollution and marine spatial planning) [86]. In contrast, based on the frequency of actor profiles associated with different sectors in our netmaps, this research finds that major BE stakeholders see fisheries, tourism, and shipping as the most important sectors in Bangladesh's BE (see Table 1 above). This could be because coastal tourism and recreation, marine fisheries and aquaculture, and maritime transport are well established and contribute to the national economy of Bangladesh and are reflected in the Bangladesh government's recent focus on investing in coastal industries [94]. For instance, in southeastern Bangladesh, the government along with international and national alliances is investing in megaprojects like coal-based energy production and deep-sea port terminals in Maheshkhali Island. To ensure the triple bottom-line objectives of the BE, which include economic development, social equity, and environmental conservation [24,113,119], reconsideration of such investments in view of other critical sectors is crucial for sustainable development. For instance, food security is often overlooked or inadequately considered in BE discourses [46]. The BE network perceived by our researcher netmapping group included the Ministry of Food as well as a few national and international NGOs working on food security. This acknowledgment of governmental and non-governmental actors related to food systems is a gateway for transformative change toward attaining food security as a key part of economic development in Bangladesh. The identified actors could play a significant role in stakeholder consultation to assess the links and possible trade-offs between food security and different forms of economic growth. In addition to food production, another critical sector to promote an equitable and sustainable BE is the renewable energy sector [81]. Actors of the renewable energy sector were completely absent in our netmappers' perceptions. This might have been partly caused by the eventual composition of the netmapping groups (which, despite our invitations, did not contain representation of the energy sector) but it also clearly indicates a narrow vision of the BE. This could undermine needed future shifts from conventional energy to renewable energy in the BE in Bangladesh.

Transboundary stakeholders play a crucial role in comprehensive management for an integrated cross-sectoral approach to the BE [47]. Notably, the participants of the netmapping exercise in this research did not perceive any BE stakeholders beyond national boundaries. Possible candidates would have been, for example, the South Asian Association for Regional Cooperation (SAARC) and the Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC) and

their links. Spanning multiple national jurisdictions and the establishment of appropriate legal frameworks is vital to agree on and enforce decisions and standards [102]. For instance, to manage the Hilsa shad (*Tenualosa ilisha*) fishery in Bangladesh, collaborative efforts between neighboring countries have been recommended [88]. BE management needs to promote cross-boundary collaboration, as maritime spatial management often has implications for multiple countries [43,109,121]. Moreover, transboundary partnerships facilitate data sharing and alignment that could generate a collaborative response to the regional challenges in marine area management [120]. With a broader sectoral and explicitly transboundary perception of the BE that is shared both nationally and internationally, social equity, and coastal and marine conservation could be more effectively pursued as part of an inclusive BE development approach.

4.2. Towards inclusive, collaborative, and decentralized Blue Economy governance

Effective collaboration and harmonization between states and other stakeholders within marine regions is needed for these entities to effectively shape and implement ocean policies and governance [115]. Government actors were seen as central in the BE of Bangladesh by all four stakeholder-specific netmap groups. Moreover, there is a broad consensus that national-level governmental actors are the key governing entities with high formal command over other actors. Researchers, NGOs as well as actors from civil society and the private sector perceived themselves as part of BE governance, but only in knowledge sharing and funding capacities. BE governance must consider inclusivity, capacity, and roles of diverse stakeholders through a governance structure that is legitimate, connected, nested, and polycentric [16]. To bridge the gap between worldwide expectations and local needs, a decentralized governance structure that acknowledges culture, scale, and, capacity is crucial [17]. Research, private sector, civil society, and NGO stakeholder representatives perceived Bangladesh's BE governance networks as polycentric (Fig. 1b, c, and d) and also well-connected to key governmental actors. Unlike the centralization perceived by the government netmappers, the polycentricity highlighted by the other three netmapping groups may prevent institutional collapse under adverse conditions [87]. This perceived polycentricity should be recognized by government and decision-makers to promote institutional diversity that could contribute to a larger social resilience.

Intersectoral conflict, a key obstacle to sustainable coastal economic development, was identified by a few BE actors representing diverse sectors in the perceived netmaps. Links of competition and obstruction were highlighted between the tourism and shipbreaking sectors, within a few entities of the fisheries sector, and between some international NGOs. Although such perceived conflicts among stakeholders could be seen as a challenge for BE development, such constructive tensions could be used as a gateway to drive collective dialogue, strategy building, and the development of favorable governance structures [76]. In the context of Bangladesh BE, strategically addressing these intersectoral conflicts could be a crucial step towards building the synergies required for collective action. Our findings indicate that 'information and support' was the link most frequently perceived by our BE netmappers. We suggest that the identified information and support networks could be the 'point of departure' for facilitating conflict resolution processes and synergy development among the BE actors in Bangladesh. By further enhancing these knowledge-sharing and collaboration linkages, governance actors may able to identify shared interests and opportunities that could drive sustainable outcomes [9]. Conflicts between and within different actor groups are already affecting resource management in the fisheries [103] and aquaculture [56] sectors of Bangladesh. Resolving such actor-actor conflicts is important for Bangladesh's BE to collectively tackle bigger challenges and growing threats such as rising sea levels, coastal erosion, and pollution from land-based sources [97]. Building synergies among stakeholders by enhancing the knowledge and support network identified in our study can promote inclusive BE development and governance that could set the scene for compatibility, opportunities, and sustainability [105]. Such strategic conflict resolution within a polycentric governance system could reduce risks, such as displacement, dispossession, grabbing, environmental degradation, and loss of resource access rights associated with BE implementation [14,114].

4.3. Navigating international actors and their influence on the Blue Economy

In the quest for economic development to provide a better standard of living to their citizens, the underdeveloped nations of the Global South strongly rely on international aid and investments. While still burdened by extreme poverty, Bangladesh has the ambitious target to reach the developed nation status (according to IBRD[3] definition) by 2041. Over the last decade, international investors have been welcomed for rapid economic development through the diversification of industries in specific economic zones [6]. Our findings suggest that despite the failure of the main BE stakeholders to develop a transboundary vision, the BE of Bangladesh is perceived to include many international actors. These include international NGOs, banks, foreign government agencies, inter-governmental organizations, and international organizations that have been predominantly net-mapped as critical funders. Considering that BE initiatives in Bangladesh are still at an early stage, the well-established position of international actors in the BE governance space is an important observation. On the background of extensive international engagement and a record of influential "donor consortia" in the now 50-year-old state of Bangladesh that started in a difficult context of poverty, this raises questions about the objectives, interests, and agendas of such investors. For instance, it is argued that international entities are interested in investment in Bangladesh because of the untapped natural gas sources in the country's coastal regions [101]. Our netmapping groups saw most of the funding from international actors as directed towards two main entity types, the Ministry of Fisheries and Livestock and some scientific institutions. Hence, funding for the BE in Bangladesh is seen to be focused on the fisheries sector and marine and ocean-related research and education. These international actors have a potential role in restoring and enhancing ocean health through their funding capacities [108]. This is likely to allow them to gain major influence on ocean health and transformation processes.

As one of the top climate-vulnerable countries, Bangladesh needs to invest in climate adaptation strategies and technologies [29]. International banks play an important role in supporting Bangladesh in these realms but their financial support often comes with vested interests. Foreign agencies, such as the Japan International Cooperation Agency (JICA) and the National Thermal Power Sector (India), from more powerful countries, are investing in coastal mega projects, such as thermal power plants in Bangladesh. Notably, the same countries that are investing in such fossil fuel projects in Bangladesh have put a stop to the establishment of similar destructive developments in their territories in order to progress towards environmental and human health and climate safety [84]. This highlights the environmental and climate injustice faced by Bangladesh in the face of economic growth supported by powerful international and mainly private sector actors [106]. Such complex and large-scale projects executed through collaborations between national and international entities, frequently overshoot projected costs, fail to adhere to timelines, and rarely achieve desired results or public acceptance [111]. This reinforces the economic disadvantage for the poorer nations as increasing interests and service payments push them into a vicious circle of debt trap [67]. The international actors identified in our BE netmaps are seen to be more central in the funding network than the information and support network. This suggests that

[3] International Bank for Reconstruction and Development (IBRD) is a development cooperative, globally, owned by 189 member countries.

foreign investments in the BE of Bangladesh are focused more on financial and infrastructural-based rather than knowledge-based investments. This could lead to a neglect of local capacity building, prolonging the host country's dependence on external expertise and technologies, often enforced through disadvantageous contracts between the host country and investors. Such contracts have been found to sideline local knowledge and initiatives and constrain opportunities for local entrepreneurship [82]. To address these issues, BE policies in Bangladesh should create regulatory frameworks [33] to establish and support the role of international actors in transferring knowledge, enhancing skills, and building capacity. A balanced approach that includes financial, technological, and knowledge-based investment is crucial for the sustainable and inclusive development of the BE in countries of the Global South. International investors, acting as 'development partners' should take the responsibility of enabling an appropriate space for inclusive BE, while their appropriation of local spaces should be monitored.

4.4. Unveiling marginalization and exclusion among Blue Economy actors

Coastal and ocean economies build upon established businesses and industrial sectors, novel technologies, and new sectors with diverse emerging actors. In such rapidly changing political economies, power comes to be more unequally distributed over time, and this influences development and transformation paths [20]. Action groups, at local and higher system levels, could act as a driver of change [77], but skewed power dynamics are strong in the Global South as gender, caste, class, and religion segregate people already. The netmaps produced during our research show how important sections of public and private institutional actors view diverse actors' positions, influence, and power dynamics in Bangladesh's BE governance. We have found that powerful actors are almost entirely overlooking the role and influence of coastal communities and resource users in the BE of Bangladesh. In addition to excluding local resource users, most perceptions of BE governance also see no government actors below the national level as part of BE governance. The influence-based actor network as perceived by our national government netmappers only includes national-level stakeholders. This raises the question of where exactly any of the local stakeholders are placed in BE development-related decision-making, planning, and implementation in Bangladesh and the associated equity implications [35]. From the perspective of procedural equity, this perceived and most likely actual lack of representation of local actors perpetuates power imbalances and limits the local voices in influencing policies and practices that might impact their lives and livelihoods. It also raises concerns about distributional equity of the cost and benefits of BE development in which communities are often bearing the environmental and social burdens without a share in the economic gains.

Sustainability along with equity in a BE context requires a collaborative approach involving resource users, local communities, and Indigenous populations [44,80], and including the often-marginalized female members of these and other groups [22]. To safeguard natural assets and foster sustainable development, local communities need to be enabled to embrace ocean-related endeavors through inclusive planning and implementation, ensuring equal consideration for their priorities and knowledge [12]. Those responsible for ocean governance have a significant influence in transitioning towards a more inclusive economic paradigm, potentially fueling substantial, and more fairly distributed economic development [8]. Keeping local communities in the center of the BE, while co-creating an easily understood language for them, as well as for collaborators, practitioners, and policymakers, is widely recognized as an essential step toward a sustainable BE [44,74].

Another group of marginalized actors, while not explicitly excluded, remain concealed within a few 'umbrella nodes' of the netmaps produced during this research. These umbrella nodes generically represent stakeholders involved in specific BE sectors or industries. For instance, actors like 'shipbreaking industries', 'shipyards', and 'shipping companies' encompass a range of actors involved within each of the respective industries. It is important to note that the powerful actors within these domains, such as 'ship owners associations' and 'shipbuilders associations' were identified and mapped. In contrast to this, no nodes appear that highlight the role and influence of the labor force that is the backbone of, for instance, the shipping industries in Bangladesh. Such lack of information on the position, role, and power of the workforce indicates that BE development may pay limited attention and priority to the wellbeing of these marginalized actors. Considering the existing infringements of human rights in BE sectors, such as shipbreaking [5], aquaculture [40], and fisheries [11], this is an important point to note. This perception gap identified in our netmaps is especially pronounced in government and NGO representatives' viewpoints, although their roles include the promotion of social well-being and equitable development. This indicates that BE in Bangladesh might be malfunctioning in terms of integrating community-level values, needs, and opinions into the processes of development, rulemaking, and governance. This reinforces the finding that equity is missing from national-level BE goals [37]. In sum, our findings and supporting literature indicate that strategies for more inclusive and equity-oriented BE planning and implementation are needed.

4.5. Outlook: Blue Equity and the way forward

The initial BE concept accentuated human well-being, fairness, and justice, but business strategies that concentrate solely on ocean-related economic expansion have come to prevail [14,15,72]. The work presented here suggests that considering equity (or 'blue equity') as central to Bangladesh's BE governance is now needed. Blue equity, we assert, is the equitable BE that ensures social justice through representation, recognition, and distribution of access and benefits, in a context of clear and realizable legal rights. It involves a holistic approach ensuring that all segments of society, particularly local communities, and vulnerable populations, can access, participate in, and benefit from BE activities. We suggest that to enhance the consideration of blue equity, national-level BE policies and governance should focus on three specific realms: knowledge, policy, and action.

4.5.1. Knowledge

To tackle the identified exclusion of labor and small-scale producers and to ensure that the views and voices of all stakeholders are documented and shared, a 'Community of Practice on Blue Economy Governance' (CoP-BG) could be established. For instance, the project "Emerging Ecosystem-based Maritime Spatial Planning Topics in the North and Baltic Sea Regions" (eMSP NSBR[4]) explicitly works on developing a strong community around BE development. The CoP-BG we are suggesting here would create a space for all BE stakeholders to share successes and failures, and track progress in different BE sectors, guided by an agreed code of conduct. This would increase transparency, allow harmonization among stakeholders, and reduce inter-agency or intersectoral conflict. The CoP-BG could act as the regional bridge to disseminate international and national knowledge to facilitate capacity building among local stakeholders. This would allow CoP-BG to take evidence, and recommendations from dialogues to decision-makers, such as Bangladesh's Blue Economy Cell (BEC). Such a platform would enable a transformation towards recognizing the interests, needs and challenges of transnational, regional, and local BE stakeholders and thus likely fill the identified knowledge gaps in the BE network and overall BE governance. By creating enabling conditions for co-creation of, access to, and exchange of knowledge, the CoP-BG could actively support the just and informed representation of stakeholders. This in turn would enable all stakeholders including those that are currently excluded and

[4] https://www.emspproject.eu/project-activities/

marginalized to actively participate in and influence BE decision-making.

4.5.2. Policy

A comprehensive, and knowledge-driven strategy for governing the oceans that is shared by BE stakeholders is needed [118]. For this, influential BE decision-makers need to better understand requirements in diverse sectors. In Bangladesh, the leadership of the BE is seen to lie with the national government, as highlighted by all stakeholder groups in this study. There is an urgent need for coordinated and collaborative efforts in the BE to translate policies into action-based plans. As was the Access to Information (a2i) program in the context of Digital Bangladesh [107], the BEC and its initiatives could be relocated to the Prime Minister's Office for an effective coordinating role. Key aspects of policy development and appraisal include decentralizing BE governance, including coastal communities as BE actors, enhancement of knowledge systems and knowledge-based investments, developing food security through BE, and enhancing ocean and coastal-based renewable energy sectors. Our netmap findings can act as a baseline to understand the existing BE network in Bangladesh and support better planning of BE policies and governance. While effective overall coordination of the BE requires the BEC to be positioned centrally, the sectoral strategies and action plans (CoP-BG) need the active involvement of diverse stakeholders. Bangladesh has set a positive example of inclusive participation by engaging around 5000 people in consultations at different levels while formulating its National Adaptation Plan (2023–2050) [59]. Such inclusive participatory practices should continue beyond policy planning and extend to the tracking of implementation progress. BE stakeholders including the marginalized groups must be enabled to monitor policy execution and provide feedback. This will ensure transparency, accountability, and more equitable outcomes in BE governance.

4.5.3. Action

In light of BE opportunities and risks for the resource users [14], the idea of "Real World labs" or Living Labs [49] holds the potential for a reality check on what is achievable through evidence-based actions for a transformative change supported by knowledge and policy enhancement. In Bangladesh, BEC and CoP-BG can collaborate to initiate a "Real World Lab" program. This could enable the government and non-government actors to work together to expedite a crucial and complex economic system, like the BE, which is currently lagging due to multiple challenges. As the key element of the Community of Practice outlined above, this entity could be guided by three major paradigm-shifting pathways: i) ***Transforming stakeholders' mindsets:*** Shifting concerned stakeholders' conventional solely growth centered image of BE to a wider, diversified, and inclusive vision that considers BE as integral part of a larger social-ecological system. This could be pursued through formal education, training sessions, and awareness campaigns, as well as in mentorship programs for government officials and other stakeholders. ii) ***Resourcing enabling environment:*** Government and international development partners need to finance the CoP-BG activities through multifaceted funding and investments. Additionally, the Government should also allocate sufficient resources to run the BEC (for instance, the climate-relevant budget, see [68]). iii) ***Facilitating evidence-informed policy and practice change:*** As noted above, the evidence gathered by the CoP-BG should help the BEC to coordinate BE-related policy and practice change. Drawing insights from programs, such as climate action [2] and the SDGs [104], a small grants program could be launched to showcase research-to-policy actions in the BE governance space of Bangladesh. It needs to be noted that co-managed governance approach in itself does not automatically address preexisting asymmetries in power and thus runs the risk of perpetuating them [34]. Therefore, CoP-BG must be carefully designed and implemented by positioning equity as a core principle to ensure the creation of a transformative space for inclusive BE governance.

5. Conclusion

This research outlines how perception-based network analysis that features diverse actor groups' viewpoints can help to understand complex systems of social-ecological change. Our analysis of BE stakeholders' perceptions in Bangladesh has highlighted important gaps, challenges, and some strengths in BE governance. The gaps we identify in existing governance and knowledge systems, in the distribution of power and influence, and in the context of marginalization and exclusion showcase a very narrow, growth-centered lens of the BE and associated stakeholders. This sets the scene for future strategies and interventions, with a focus on BE stakeholders. Further studies would need to investigate the views and knowledge, as well as the network perceptions of those hitherto excluded, and review BE policies and legislative complexities in this light. We recommend this multi-stakeholder perception-based approach to identify, map, and understand the nuances and complexities of larger social, economic, technological, and political systems. Considering some of the outlined limitations in our approach (Section 2.9), we recommend an in-depth analysis of BE governance strategies at different governance levels for an enhanced understanding of such systems. In the context of Bangladesh's BE governance, we see the need for a more active Blue Economy Cell (BEC), which strengthens BE governance networks, allows for decentralized authority, and for more responsible investment by foreign entities, and just consideration of local resource-users. Initiatives such as the CoP-BG that we propose could provide evidence for transformative policies. A functional BE governance network in Bangladesh that goes beyond the current tendencies toward indiscriminate growth orientation could enhance a credible and legitimate BE in Bangladesh that mobilizes sustainable development.

CRediT authorship contribution statement

Jewel Das: Conceptualization, Methodology, Investigation, Data curation, Formal analysis, Validation, Writing – original draft, Writing – review & editing. **Maheshwaran Govender:** Methodology, Data curation, Formal analysis, Visualization, Writing – original draft, Writing – review & editing. **Haseeb Md. Irfanullah:** Project administration, Investigation, Validation, Writing – review & editing. **Samiya Ahmed Selim:** Supervision, Project administration, Investigation, Writing – review & editing. **Marion Glaser:** Conceptualization, Funding acquisition, Supervision, Methodology, Validation, Writing – review & editing.

Data availability

Data will be made available on request.

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Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.marpol.2024.106359.

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