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UTILIZATION OF NODES IN STRENGTHENING THE SOCIAL CAPITAL CAPACITY OF COASTAL COMMUNITIES IN SIBOLGA CITY AND CENTRAL TAPANULI REGENCY, NORTH SUMATRA PROVINCE

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ABSTRACT
Social capital capacity is a reliable lubricant in organizing and structuring communities, which is functional for the quality of relationships among stakeholders. Social networking, as a component of social capital supported by the level of trust, can serve to reduce the destruction of coastal ecosystems through the role of intensively focused nodes committed to conservation movements. These nodes hold central positions as connectors interacting with stakeholders and shareholders in coastal ecosystem preservation, particularly in the protection of mangrove forests and coral reefs in the coastal areas of Sibolga City and Central Tapanuli Regency. The utilization of nodes is indicated through phases of identification and grouping into institutions and organizations dedicated to mangrove and coral reef preservation, as well as the purification of trust values among the coastal population.
Keywords: **Coastal Ecosystem, Conservation Strategy, Node, Social Capital, Social Networking.**

INTRODUCTION

The trend of policies developed by the Regency / City government after the implementation of regional autonomy authority, it turns out that it tends to be compromised with the behavior of exploiting the natural resources available in their respective regions, including coastal areas for development purposes in the name of living welfare and meeting community needs. The implementation of regional autonomy with the legal umbrella of Laws No. 22 and 25 of 1999, which was revised by Law No. 32 of 2004 and Law No. 12 of 2008, in addition to having encouraged a paradigm shift in government and regional development policies to implement the principles of reinventing government,community development based,civil society empowering and democratization, further has implications for districts and cities that have water or ocean areas. The positive implications of the realization of regional autonomy authority have not been able to meet expectations for development policies that are concerned with environmental sustainability and the principle of sustainability. Many local governments are still oriented towards the exploitation of natural resources (modern worldview environment paradigm), so far from the deep ecology

paradigm that prioritizes environmental ethics framed by ecocentrism and the use of ecosophy that develops in society (Bell-James, 2020; Zirino et al., 2013). The utilization of ecosophy (Levesque, 2016) as an instrument to improve the quality of the environment and nature can be applied through the awareness ofmind-set inherent in the culture of individual behavior and coastal communities. Efforts to conserve coastal ecosystems are not just actions to comply with various structural rules and regulations because of rewards and punishments. So far, protection efforts have been carried out at the operational level based on their effectiveness, which prioritizes the role of government organizations with a structural approach. To protect the degradation of environmental quality due to overexploitation, environmental damage and pollution, steps based on shared perceptions are needed. Therefore, the involvement of various parties, including the community, is a strategic aspect that can reduce the derivative tendencies of development policies and community actions that are exploitative of coastal ecosystem resources. The deep ecology paradigm that advocates the synergy of various elements of the social capital of coastal communities is inherent in coastal ecosystem conservation strategies. The significance of social capital in coastal ecosystem conservation can follow Putnam's opinion which underlines that the development of social capital is a movement with the community, where: (a) social capital allows every citizen to be involved in finding solutions to common problems, (b) social capital becomes a lubricant that drives the wheels of community development without significant problems, (c). mutual care, tolerance, and empathy are greater in the presence of social capital, (d). social capital affects a person's economy, meaning that more people get jobs and increased trust arises in personal relationships (Halstead et al., 2022; Hawes & McCrea, 2018). Sibolga City and Central Tapanuli Regency, as two adjoining autonomous regions that have inseparable marine and coastal areas known as the Tapian Nauli Bay area. The reality of the development of Sibolga City and Central Tapanuli Regency in the last 10 years has been a policy with a shallow environmental ethics format. As a result, the management and conservation of coastal ecosystems in Central Tapanuli Regency and Sibolga City are burdened with the impact of modernization, regional development orientation, fisheries technology development, investment policies and economic growth.

The coastal ecosystems of Sibolga City and Central Tapanuli (read: Tapian Nauli Bay) have changed as a result of the implementation of regional autonomy, including the transfer of land use for various city facilities and infrastructure, the fishing industry, residential areas, mooring ports for fishing motorboats, PLTU Labuan Angin, and the distribution of fishing areas for modern technology motorboats developed by fishing communities. If the above conditions continue, the degradation of the quality of the Tapian Nauli coastal ecosystem (read: the designation for the coastal waters of Sibolga City and Central Tapanuli Regency) will always be colored by the practice of anthropocentric environmental ethics, which urgently needs a coastal ecosystem protection strategy with ecocentric character based on community participation by utilizing the potential of social capital. Therefore, this paper aims to offer a novelty of the research results of Sitorus, et al (2024) regarding the utilization of the role of nodes that exist in social networks by strengthening their social capital capacity to be functional in the protection of coastal ecosystems, especially mangroves and coral reefs in the Tapian Nauli bay coastal waters.

This study is supported by the theory of social structure and action, the conception of social capital, social network analysis, social engineering, and coastal ecosystems.

The results of the research study are aimed at formulating the concept of a strategy to strengthen the capacity of social capital in the preservation of coastal ecosystems in the coastal areas of Central Tapanuli Regency and Sibolga City, especially mangrove and coral reef conservation, where the analysis covers patterns of values and norms, the capacity of various institutions, communities and their networks in coastal ecosystem conservation patterns, specifically the utilization of nodes that act as a link in the social network of coastal community communities that have potential as a group that has awareness for environmental conservation of coastal areas. The benefits of this research are important, especially in terms of organizing government institutions and local communities of coastal communities that are built in the chain of social networks and coastal ecosystem conservation institutions with reciprocal relationships and mutual trust between stakeholders and users of coastal ecosystems, which are expected to overcome the problems that trigger coastal environmental degradation in Central Tapanuli Regency and Sibolga City.

LITERATURE REVIEW

The idea of uniting ecological organizing and social capital is currently very developed, including the views of James E. Nickum who states that social capital can be equated with other forms of capital, where it is a prerequisite for productive action towards social and environmental welfare. Social capital is another way that is included as a low transaction cost production system (Fussell, Harrison-Rexrode, et al., 2006; Ludorf, 2016). James Coleman in an article entitled "Social Capital in the Creation of Human Capital," published in the American Journal of Sociology (1988), defines social capital as a set of values or informal norms shared among members of a group that enables cooperation among them. Aspects of the structure of relationships between individuals allow individuals to create new values. Social capital may be as important to the success of an organization as structural, customer and human/intellectual capital. In fact, all these latter forms depend to some extent on the quality of the relationships among their stakeholders. The effectiveness of an organization - innovation, productivity and employee satisfaction - hinges on the strength of the relationships of its people. The sum of the relationships among people, norms, values and shared meaning in an organization is often called social capital. Social capital cannot be separated from society, which is described as togetherness, solidarity, tolerance, the spirit of cooperation and the ability to empathize. Togetherness itself can ease the burden through the sharing of thoughts, which affects the fighting power and the higher quality of life of the community (Alfitri, 2023). Therefore, social capital is important for the sustainability of a community because (1) it provides easy access to information for community members, (2) it is a medium for sharing power for the community, (3) it develops solidarity, (4) it allows the mobilization of community resources, (5) it allows for joint achievements, and (6) it shapes community behavior and organization (Lesser, 2000). Social capital can be approached from two perspectives, namely studying social capital from the actor's perspective, which follows Bourdieu's construct of social capital, that social capital is based on the behavioral resources of individuals who use it because of the ownership of exclusive networks. Furthermore, Puttnam's concession pivots on society's perspective,

where he interprets social capital as a public good that can be regulated by organizations and horizontal networks that appear in society (Rosyadi, 2003). Social capital is a concept that is built on three main pillars, namely values and norms, networks and institutions that are present in social relations (Bhandari & Yasunobu, 2009; Laužikas & Dailydaitė, 2013).

The main concern in this paper is the third aspect of social capital, namely networks, where networks are formed on the basis ofrepeated social experiences traditionally with similarreligious beliefs that tend to have high cohesiveness, but there is still a narrow range of networks and trust. A social network is a group of people connected by feelings of sympathy and obligation and by the exchange of norms and civic engagement (Alfitri, 2023). Social capital and nodes in social networks are closely related. Nodes are points or entities in the network that represent individuals, groups, organizations, or other units that interact in the network. Nodes are: individuals, groups, organizations, and related systems that tie in one or more types of interdependencies. In the context of social networks, nodes are social actors that are connected to other nodes through relationships or ties(edges or ties). Nodes as entities in social networks carry and distribute social capital through their relationships. The position and role of nodes in the network greatly influence the access and distribution of social capital. Through social network analysis, it is possible to understand the structure of social capital and how it can be mobilized to achieve larger social and ecological goals. Social network analysis views social relationships in terms of nodes and ties. Nodes are the individual actors within the networks, and ties are the relationships between the actors. There can be many kinds of ties between the nodes. Research in a number of academic fields has shown that social networks operate on many levels, from families up to the level of nations, and play a critical role in determining the way problems are solved, organizations are run, and the degree to which individuals succeed in achieving their goals. Thus, efforts to involve various parties can be approached by strengthening social capital in organizing government institutions and local communities in the coastal community in a chain of networks built with reciprocal relationships and mutual trust, the results of which are significant in preserving especially the protection of the coastal ecosystem of Tapian Nauli Bay, especially mangrove forests and coral reefs, including the degradation of environmental resources in the Central Tapanuli Regency and Sibolga City.

RESULTS AND DISCUSSION

Conservation Behavior of Coastal Ecosystems of Coastal Communities of Central Tapanuli Regency and Sibolga City

The ocean is one of the most complex ecosystems in terms of configuration and function. The utilization of the sea in order to reduce the impact of global warming, including the proposal to reduce emissions due to environmental degradation and deforestation known as the REDD initiative. Coastal communities, however, do not know the specific ecological functions of the ocean that were schemed to address the world's climate change problems, and were discussed by world leaders in Copenhagen, Denmark in December 2009. This is in accordance with the answers of 200 respondents in this study, where 132 people (66%) stated that the function of the sea is a source of livelihood, 11 people (5.5%) as a medium of transportation by boat and the like for human mobility from island to island.

Table 1. Respondents' knowledge and treatment of the function of the ocean and its contents

Variety of ocean functions according to respondents	F	%
Livelihood, fishing	132	66
Medium means of transportation	11	5,5
Place where fish live	16	8
Source of medicine	5	25
Tourism object	14	7
As a place of life for fishers (fishermen)	5	2,5
Marine resource ecosystem	4	2
Salt source	2	1
None	1	0,5
Don't know	12	6
Total	200	100

Source: Processed from primary research data, 2022 and 2023

Knowledge of the functions of mangroves, mentioned by various local names by bakko respondents, includes direct benefits as a source of charcoal wood, firewood, board material, foundation for stilt buildings, house fences. However, the most common ecological functions described by respondents included protection of the coast from abrasion and erosion and tsunamis, protection of the coast because it can break waves and reduce the direct impact of sea storms, breeding grounds for fish, climate conditioning, and shelter for various types of animals that have habitats on the coast.

Table 2. Respondents' views on the economic and ecological benefits of mangroves

Benefits of Mangroves
1. Prevent flooding and minimize the impact of Tsunami
2. Maintain coastal abrasion
3. Retaining and breaking waves, preventing erosion 3.
4. Weather balancer and sea current barrier
5. Breeding ground for marine fauna
6. Animal shelter
7. Prevent coastal erosion
8. Bollards, house stakes, house frames and roof leaves
9. For firewood and charcoal
10. To strengthen building foundations and bridge piers on stilts

Source: Processed from primary research data, 2022 and 2023

Respondents' recognition of coral reefs was mentioned by various local names, including sea flower, gadung coral, datak-datak tree. The types of coral reefs around the village waters were named as finger coral, seaweed, plate coral, bahar root, pepper flower, jariamun, bahar coral. The location of coral reefs can still be found around the waters of the research village, including on the edge of the managosang sea, in the wind labuan, white sand and simantuk, tip kabun, sorkam waters, karik island, sijagojago sea, mursala island,

poncan island, long island, pohan island, pandan island, situngkus island, princess island, simanto island, poultry island, and Mursala island. The function of coral reefs according to the introduction of respondents includes as medicine (bahar root), decoration, fish nests, fish spawning places (laying eggs), and breeding, as a coastal protection from wind, and others.

Social Capital Capacity of Coastal Communities in Central Tapanuli Regency and Sibolga City

The level of trust is a pillar of the socialcapital of the social community, which can be seen from various aspects, including neighborly relations, views on social elites, community institutions and government officials. Based on this research, the level of trust of respondents varies to all neighbors and families who are around their home environment, where there are even 4% answering that all neighbors are very trustworthy. However, 46% answered that not all neighbors are trustworthy. This study illustrates that respondents' level of trust in their neighbors is not affected by the neighbors' religious or ethnic background.

Table 3. Composition of respondents based on figures most respected by the community

Social Status Label	F	%
Village Head / Local Government	121	60,5
Youth leaders/CBOs	4	2
Traditional leaders	26	13
Religious leaders	24	12
Rich people	6	3
Political party leaders	9	4,5
others	10	5
Total	200	100

Source: Processed from primary research data, 2022 and 2023

The level of trust in the administrators of community organizations and social communities such as PKK, Perwiritan, STM and community leaders was found to be high. Thus, this study sees the importance of the element of trust in leaders and neighbors as the essence of social capital that is most influential in increasing community participation in the management and conservation of coastal ecosystems.

Table 4. Composition of Respondents based on Level of trust in community leaders to represent them in problem solving

Believe in People	F	%
Sure	140	70
sure, but not for everything	38	19
less sure	12	6
not sure	10	5
Total	200	100

Source: Processed from primary research data, year 2022 and 2023

Utilization of Nodes to Strengthen Social Capital Capacity in Coastal Ecosystem Conservation

Social capital becomes effective when social networks function. The condition of coastal ecosystem protection becomes more controlled related to the existence of social organizations in the community that are interconnected with other institutions that have the same intense attention to coastal ecosystem protection. From the results of this study, the existence and role of social organizations, NGOs, Youth, Religion, Culture, Economy and politics in the research village that are related to the protection of coastal ecosystems is very minimal. Since 2018, there have been LPTSK and POKMAS in the context of mobilizing NGOs for community empowerment in villages that are the location of COREMAP II in Central Tapanuli Regency, namely the Wahana Lestari Pandan NGO with its main activity of assisting the community in developing MPA (alternative livelihoods), including dumbo catfish enlargement, seaweed cultivation, trepang enlargement, and fish processing and salting. However, the focus of this NGO's activities is not directly related to the conservation of coastal ecosystems, because the orientation of its role is in efforts to improve the welfare and income of fishermen, with the hope that fishermen do not use fishing gear that is destructive to coral reefs, reduce the practice of people cutting mangrove wood illegally which is used for baker wood or sold as a source of income. One of the strategies developed is to build participatory institutions in coastal ecosystem conservation, so that the capabilities of social organizations are needed as part of the generation of social capital of coastal communities that are effective in protecting coastal ecosystems in Sibolga City and Central Tapanuli Regency.

Table 6. Respondents' willingness to be actively involved in forming institutions (NGOs or community groups) of coastal environmentalists in environmental conservation

Willingness	F	%
Yes, willing, because it is an obligation as a member	129	64,5
Yes, depending on the need	65	32,5
No	6	3
Total	200	100,0

Source: Processed from primary research data, year 2022 and 2023

The opportunity that can be followed up in the following stages of research is the high level of willingness of research respondents (114 people or 57%) to be actively involved in the institutions formed to carry out various programs and activities for the protection of coastal ecosystems in Central Tapanuli Regency and Sibolga City in the following periods, even though the funds or budgets that must be prepared independently when the budget is limited or not available because they already have the awareness that preserving the environment, especially coastal ecosystems which are part of their daily lives, is a selfless obligation.

Table 7. Respondents' willingness to be actively involved in organizations aimed at protecting coastal environmental conservation even though there is no budget or limited financial assistance.

Willingness	F	%
No answer	14	7
Yes, willing, because it is an obligation as a member	114	57
Yes, depending on the need	68	34
No	4	2
Total	200	100

Source: Processed from primary research data, 2023

Efforts to approach the coastal ecosystem conservation movement can be carried out by diversifying social networks in the social capital structure, by utilizing the social network analysis (SNA) method, which is an analytical approach used by using graph theory in measuring and mapping the relationships contained in a social network. There are two main concepts, namely nodes are actors or entities in social networks such as individuals or organizations and edges are relationships or interactions between actors. Some of the main principles of social network analysis are (Wasserman & Faust, 1994):

1. Actors and actors' actions are considered interdependent on each other and not as a stand-alone or completely independent unit
2. Relationships between actors serve as channels for transferring or channeling resources both material (such as money) and non-material (such as information).
3. Individual-focused network models see the network structure as a factor that provides opportunities or barriers to individual action.
4. Network models describe structures (social, economic, political and others) as enduring patterns of relationships among actors.

In the development of social network analysis methods, the unit of analysis is not the individual, but groups of individuals and the relationships between them. Network methods focus on dyads (two actors and their relationships), triads (three actors and their relationships), or larger systems (sub-groups) or entire networks. It therefore requires special methods that can analyze these relationships precisely. Efforts to utilize nodes in strengthening the capacity of social capital as a strategy for developing community participation in coastal ecosystem protection can, in principle, follow the following steps: (a). This method requires the collection of information on each actor and each tie to each other actor, (b). Essentially, this approach conducts a census of the attachments of all actors in the population, rather than a sample, (c). The method begins by approaching a focal actor or a group of actors, (d). Each of these actors is asked to name some or all of the ties that exist between him or her and other actors. Then all the names of these actors (who were not included in the initial list) were traced back and asked about some or all of the ties they had. (e). This method starts by selecting some focal nodes (egos), and identifying the nodes to which there are connections. It is then determined which nodes identified at an earlier stage are connected to other nodes, (f). The egocentric method really pays attention to the individual, not to the network as a whole. By collecting information about the connections

that exist between actors, who are also connected to each focal ego, we can still get a good picture of local networks or individual friendships. Institutional networks or social networks are one of the main elements that people often use to achieve something in the social environment through social connections between actors and parties related to the utilization of coastal natural resources. The research describes social networks in coastal communities that exist in Central Tapanuli Regency and Sibolga City in terms of coastal ecosystem conservation activities that are classified as less diverse in terms of task descriptions and performance support. Therefore, this research offers the formation of interconnected points between social network nodes consisting of; (1) the formation of a conservation coastal community group institution, (2) the inclusion of a functional stakeholder institution as a companion (NGO) in strengthening the capacity of advocacy (Board) and supervision of destructive activities (Monitor, BLH) of coastal ecosystem users, and other formal institutions. (3) The existence of a mangrove ecosystem conservation extension program sourced from regulations from the Ministry of Agriculture and Fisheries and the Environment of the Republic of Indonesia. In addition, the communities of the coastal villages of the Tapian Nauli coastal area, in general, do not yet have written rules, such as slogans prohibiting from throwing garbage or other materials that are harmful to the beach, which are made unilaterally, that it is not a shared value of the entire community in terms of preserving beaches and ocean waters. When at sea, some crew members seem to ignore the prohibition of throwing garbage in the sea or on the beach. This behavior is one of the pollutants of the waters and even an obstacle to the development of mangrove forests because there are still community actions, especially residents who live in the coastal villages of Sibolga City who continue to throw garbage on the beach, and some even do it deliberately by slowly filling up the beach (reclamation), so that later the land function is diverted for housing development and motorboat mooring bases (Tangkahan). From the results of interviews conducted by researchers, it is implied that the social norms that exist in the community regarding the preservation of coral reefs and mangroves, as well as coastal areas that are still valid, have not been written down, there are still many people who violate what should be in accordance with what has been stipulated in government regulations, such as the prohibition of littering in coastal areas because it can endanger the development of mangrove and coral reef cultivation, but people still throw garbage in the sea, especially fishermen who moor in various tanks located in Sibolga City, Based on the results of this research, a strategy to strengthen the capacity of social capital by utilizing the role of nodes in the social networks that exist in the coastal communities of Kabupaten Tapanuli Tengah and Kota Sibolga is proposed, organized in the following phases:

1. Identifying nodes, starting with the stage of investigating several actors who are willing to volunteer in the coastal community who can become spirit actors initiating mangrove and coral reef conservation.
2. Building the commitment of nodes that have the awareness to become the main actors that institutionalize mangrove and coral reef conservation governance and organization.
3. Purify the Trust Value of the nodes which includes honesty, volunteerism, and commitment-loyalty to the preservation of mangroves and coral reefs, as well as strengthening the ideology of deep ecology and ecosophy that spreads to the behavior

of all parties, especially coastal residents and mangrove and coral reef conservation communities

CONCLUSIONS

The conclusion of the problems faced in utilizing coastal ecosystem resources and the coastal environment can be seen from the negative impacts that arise, such as ecosystem damage due to lack of public awareness, the absence of conservation rules or local wisdom, and low knowledge of the characteristics of coastal ecosystems. In addition, the community's compromising attitude towards the conversion of coastal land for settlements, business facilities, megaprojects, industry, and the use of modern fishing gear also exacerbates this condition. Therefore, it is necessary to increase the capacity of social capital and integrate conservation strategies that involve various parties and strengthen the role of social networks to preserve coastal ecosystems, especially in Central Tapanuli District and Sibolga City. This effort must also be accompanied by an evaluation of the Sibolga City RUTR so that reclamation and infrastructure development can be controlled for the sustainability of the coastal environment.

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