

Measurement of Sustainable Development Implementation in Coastal and Ocean Bontang City through State of the Coast Measurement Processes

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Abstract. Development of a coastal area in a sustainable manner, it is necessary to integrate both governance aspects and sustainable development aspects through an integrated coastal management framework approach, starting from preparation, initiation, development, adoption, implementation, refining, and consolidation. At the preparation stage, basic data are compiled in comprehensive and integrated measures of government policies in overcoming environmental problems as outlined in the State of the Coast (SOC) report. The purpose of SOC report development is to identify gaps and review from the aspect of Governance and Sustainability with 11 elements and 36 indicators based on the SDG's and SDS SEA Programs in a coastal area. The results of the SOC report are used as a basis for local governments to formulate policies for decision-making. Based on an assessment in Bontang City, aspects of governance, elements of policy, strategy, and planning are still relatively lacking. From the sustainable development aspect, elements of food security and livelihood improvement, management and reduction of pollution, utilization, and management of water resources and their recovery still need to be improved.

1 Introduction

Bontang Regency is strategically located on the axis of the Trans-Kalimantan road and the Makassar Strait shipping line. Administratively, Bontang City is divided into 3 sub-districts, North Bontang, South Bontang, and West Bontang. Overall, the Bontang area reaches 497.57

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Km² most of which is in the territorial waters. The highest population density in Bontang City is in the coastal area. Coastal and marine areas in Bontang City are generally utilized for public purposes, housing, aquaculture, and fishing, and special areas for public ports, tourist attractions, and strategic industries (PT. Badak and Pupuk Kaltim). Irregular and uncontrolled utilization patterns will impact environmental degradation in coastal areas in the future. In 2020, the number of marine fishery households was 3,181, while the number of aquaculture households was 410 households, and fishery products 24,545.32 tons consisting of 20,335.99 tons of marine fisheries and 4,189.33 tons of aquaculture, [1]. In addition Bontang City there are also 492 food industries, 269 beverage industries, 19 industries of forest products and plantation, and 48 other industries, [1].

As a Maritime City, Bontang City has a marine economy and industry, namely marine services, ports, sea transportation, capture fisheries, aquaculture, marine product processing industry, marine service provider industry, maritime trade, exploration, exploitation, and processing of oil and gas. in the sea (off-shore) and coastal areas (on-shore). Socioeconomic activities in the coastal area of Bontang City are conventionally managed by different line agencies. These line agencies are typically focused on different aspects of coastal and marine governance. Many agencies have overlapping responsibilities for coastal and marine governance. Most coastal management issues are not mutually exclusive to one or two sectors only. This is very clear in the various cases of multiple-use conflict, thus close coordination among these related agencies can dramatically improve their functional integration. This is a significant step towards the efficient governance of the coastal ecosystem. This integration and coordination of the various coastal and marine management efforts is a major objective of the integrated coastal management (ICM) approach. ICM is a natural resources and environmental management system that employs an integrative, holistic approach and an interactive policymaking, planning, and implementation process in addressing the complex management issues in the coastal area, [2]. Management of coastal and marine environments needs to address increasingly complex social and economic situations and plan for future developments [3].

ICM embodies a framework that links the core element of long-establish policymaking and management frameworks. The integrated policy and management element in the ICM framework emphasizes the need to perfect comprehensive governance direction to achieve sustainable development through environmental/ecological sustainability [4]. Effective implementation of these governance elements is expected to; (i) strengthen decision-making regarding the allocation and management of coastal resources; (ii) implement a system that balances conservation and protection of coastal resources to development; (iii) strengthen preparations for emergencies; (iv) promote information dissemination, advocacy, awareness, and participation among various stakeholders; and (v) setting up system for monitoring and feedback.

Management of coastal and marine environments needs to address increasingly complex social and economic situations and plan for future developments. The importance of identifying and prioritizing issues at the start of an ICM. The baseline state of the coast (SOC) is one of the tools to facilitate scientific and systematic prioritization of issues. The SOC report is a comprehensive and up-to-date document of the demographic, socioeconomic, and environmental status as well as management action in each area. The SOC also facilitates the monitoring and evaluation of the different stages of ICM implementation. This research uses SCO to measure sustainable development implementation in coastal and ocean.

2 Methodology

This research was conducted in Bontang City, using secondary data to identify gaps and review between governance aspects consisting of; (i) Policy, Strategies, and Plans; (ii)

Institutional Arrangement; (iii) Legislation; (iv) Information and Public Awareness; (v) Financing Mechanism; and Capacity Development. The sustainable development aspects consist of (i) Natural and man-made Hazard Prevention and Management; (ii) Habitat Protection, Restoration, and Management; (iii) Water Use and Supply Management; (iv) Food Security and Livelihood Management; and (v) Pollution Reduction and Waste Management through an integrated coastal management framework approach 3 indicators based on the SDG'S and SDS SEA Programs in a coastal area, using the ICM cycle approach step 2 and the ICM framework PEMSEA 2006, [5], see Figure 1.

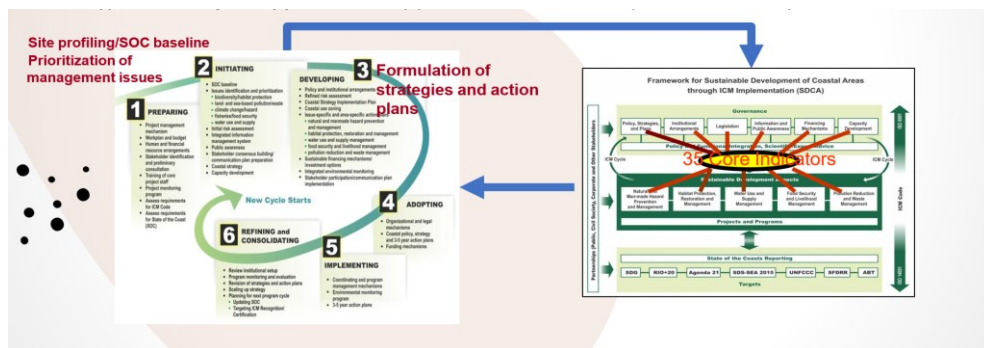


Fig. 1. Methodology to identify gaps and review between governance aspects and Sustainable Development Aspects through the ICM Framework.

3 Result

3.1 Governance Aspect

In Integrated Coastal Management (ICM) coastal governance refers to the process in which the full range of policies, laws, plans, institutional and legal address the issues affecting coastal areas, [6]. Governance sets the framework within which management can proceed as it establishes the fundamental goals, institutional processes, and structures that are the basis of planning and decision-making.

3.1.1 Policy, Strategies, and Plans

Integrated policy and management elements support the need to perfect comprehensive governance policy direction to achieve sustainable development through ecological and environmental sustainability. Policy sets the direction for action, and strategies and plans are the more concrete forms of such direction. The objective of this element is to identify the existing policies, strategies, and action plans related to coastal development and management in Bontang City. For this element, Bontang City has been effective implementation Management of coastal and small islands in the Bontang Program to synergize the Province Program with Governor regulation No 7/2009. Effective implementation of these elements is:

- Strengthen decision-making on coastal resource allocation and management.
- Put in place a system that balances the conservation and protection of coastal resources.
- Dissemination information, advocacy, awareness, and promote participation among the different stakeholders

- Coastal strategy is a set of action plans that provide long-term coastal workplan (and budget RPJMD)

3.1.2 Institutional Arrangement

Institutional Arrangements (legal and organisational) should be in place to ensure that the executing agency has the necessary authority and responsibility to implement an action plan [7]. The success of integrated coastal area management is built on a good coordination foundation. Therefore, an assessment of the coordination mechanism is needed, which includes the existence of institutional and planning mechanisms. A coordinating mechanism usually evolves from the ICM Project Coordination Committee (PCC). The decision of the PCC is executed by the Project Management Office (PMO), established to run the project. This element to identify the institutional mechanism including the organizational structure of ICM implementation in Bontang, in this element Bontang has established ICM PCC/PMO through Mayor Decree No 435/2017, as the chief executive of the Bontang PCC/PMO is the Regional Secretary the daily executive is BAPELITBANG.

3.1.3 Legislation

Most international conventions must be implemented through legislation. Local Governments play an important role in the national implementation of international conventions and are important stakeholders in coastal and watershed areas. Bontang has passed framework legislation on National, Province, and City coastal and /or marine legislation/ regulation. Mayor regulations outline the goal and course of action for the management of the seas and normally contextualize these with relation to national and province development plans. This element aims to identify relevant existing legislation/ordinances at the provincial/City level. Bontang has many regulations related to coastal management such as:

- Spatial Plan for 2012-2032, Mayor Regulation No 11/2012
- Conservation of Fish Resources Mayor Regulation No 60/2007
- Liquid Waste Disposal Control, Mayor Regulation No 9/2002
- Marine Protected Area (MPA), Mayor regulation No 16/2012
- Some monitoring activities conducted to air Emission/pollution; Utilization of Natural Resources; water quality, seagrass, mangrove, and coral reef

This legislation seeks to control or modify the general public behavior. In the context of an ICM program, legislation facilities provide legitimacy to the ICM program, become a basis for enforcing compliance, and serve as a guide for sustaining the initiative.

3.1.4 Information and Public Awareness

The development and implementation of a well-designed communications plan will increase awareness and education of the general public regarding the value and benefits of coastal and marine resources issues affecting the environment, and the need for coastal management to protect and conserve these resources. Public/Community knowledge about the function and importance of coastal systems is an important driver in achieving sustainable coastal development. Public awareness of the socio-economic and ecological importance of natural systems helps strengthen the effectiveness of management actions [8]. This element aims to identify an available communication plan, determine their target audiences and information, education, communication (IEC), and method for each of the target audiences, and also determine community participant activities and the level of participation of various stakeholders. For this element, Bontang City has been:

- socialization of the ICM program
- environmental socialization
- education and public awareness programs
- Mayor Regulation No 21/2011 related to guidelines for SCR
- Mayor Regulation No 36/2011 related to stakeholders involvement

However, education programs and public awareness are still carried out partially between the government and the private sector, as well as between the private sector in Bontang City.

3.1.5 Financing Mechanism

The sustainable financial resources among local governments are a major obstacle to achieving the goal of sustainable development of the coastal local. Where the sustainability of the ICM program depends on how revenue sources are developed and managed. This element aims to determine financial resources for coastal management activities. ICM program financial resources in Bontang routine allocations from government budgeting (DIPA) and Corporate Social Responsibility (SCR). For the sustainability of the ICM program various funding options should be explored to maintain financial input for coastal management activities as well as infrastructure and environmental services.

3.1.6 Capacity Development

Knowledge and skills of local personnel are very important for effective implementation of coastal management. Building local capacity to plan and manage local resources is very important in the ICM program. Likewise, access to training facilities and programs, as well as budget allocations is very important in building local capacity. Local capacity is also enhanced by the availability of institutions such as universities, research institutions, and local experts, which can be utilized in the implementation of coastal management activities, and training and education programs. Local personnel with appropriate skills must be able to provide their knowledge and experience in coastal management to coastal managers and other natural resources. This element aims to determine if a capacity development program has been developed as part of the ICM program and identify training relevant to coastal management. In this element, Bontang has been done with some training programs:

- Coral reef monitoring training
- ICM training
- Environmental Impact Analysis (AMDAL) training
- waste management training
- SOC Training

The technical capacity is still needed because the training is not programmed regularly. In Bontang there are 92,94.000 inhabitants and 60% live in coastal areas, but few have adequate skills to undertake the ICM Program, scientific and technical support is also weakest at the local level.

3.2 Sustainable Development Aspect

The five major components of sustainable development aspect namely hazard, habitat, water, food, and pollution represent the common concern of all local governments and communities in coastal areas.

3.2.1 Natural and man-made Hazard Prevention and Management

The main goal of this element is to reduce vulnerability and increase people's capacity to cope. The action being taken to reduce vulnerability is linked to an effort to identify and strengthen individual, institutional, and societal adaptive capacities and coping mechanisms for disaster. This element aims to identify data sources and useful references. In this element, Bontang has been developed to periodically monitor load data series of emergency disasters and data periodic of fire disasters. For this element, Bontang does not develop data environmental profile and environment assessment.

3.2.2 Habitat Protection, Restoration, and Management

Coastal habitat is a life support system that is very important in serving many sources of life. The quality of this habitat must be maintained and improved to maintain its benefits. Local governments need to specifically identify strategies and action plans for habitat management and the means to implement an action plan to show the extent to which habitat will be managed effectively.

A coastal ecosystem is healthy if is stable able to maintain biodiversity, resilient to change, and continuously provides goods and services. To support a healthy coastal ecosystem, its functional integrity, or the ability to maintain a community structure and function over the long term must likewise be protected [9]. This element aims to identify whether there has been an assessment of marine and coastal resources in Bontang and whether there have been habitat protection and management programs and activities implemented. Bontang has developed various activities:

- Ecosystem restoration and conservation related to coral reef damage
- Community empowerment in the coastal area
- Local government policies on spatial planning
- Managing protected areas
- Rehabilitated the habitats and ecosystems damaged
- greening urban areas

Protection of coastal habitats and heritage reflects the commitment of local governments to prevent habitat loss and degradation. This habitat protection helps maintain, the environmental and social benefits derived in Bontang.

3.2.3 Water Use and Supply Management

Fresh water is very important for life and effective management for sustainable use is very important for a healthy society. The aim of this element to identify; (i) what are the water sources in Bontang; (ii) whether have there been water use supply and management issues; and (iii) does the local government has a program relating to water supply use or management and conservation. For this element, Bontang has developed Mayor Regulation No 17/2012 related to the Water Conservation Area - management of conservation coastal area and Regional Water Supply.

3.2.4 Food Security and Livelihood Management

Fish is a direct product of the coastal zone, providing food and livelihoods for coastal residents, and consumers far from the coast. Fisheries management is a challenging aspect but management of marine and coastal resources is needed to ensure the sustainability of valuable natural assets. A management strategy, supported by adequate resources and

equipment, is a marker of the local government for the management of these resources. Nutritional status is an indicator that integrates the availability and equity of access to food and livelihoods. While other factors (such as agriculture and trade) can affect these numbers, nutritional status is also affected by the availability of seafood. Nutritional status is an indicator that integrates the availability and equity of access to food and livelihoods. While other factors (such as agriculture and trade) can affect these numbers, nutritional status is also affected by the availability of seafood. The element aims to identify the main source of food and livelihood in Coastal Area Bontang and identify the program to promote sustainable fisheries and aquaculture by combating illegal fishing, catch/harvest quotas, and gear regulation.

In this element, Bontang has been developed:

- Fishing production is still dominant and increasing every year
- Conservation of Fish Resources Mayor Regulation No 60/2007
- Fisheries production
- No case of malnutrition in Bontang City

3.2.5 Pollution Reduction and Waste Management

Pollution is one of the major challenges in coastal governance. Most of the pollutants come from land-based sources including industries, households, ships, sea exploration, and agriculture. This element aims to identify programs on waste sources, types of waste, and volume produced including data sources. Also to identify programs and strategies related to pollution reduction or waste management implementation. In this element, Bontang has:

- There is no data series available regarding the Pollution management plan and budget provided
- Lack of sanitation facilities
- there are no septic tank facilities for residents living above the sea
- there is no water treatment for the home industry
- No data information regarding agriculture waste

The graphic and gap between the governance aspect and sustainable development aspect detail can be seen in Figure. 2 and Figure 3.

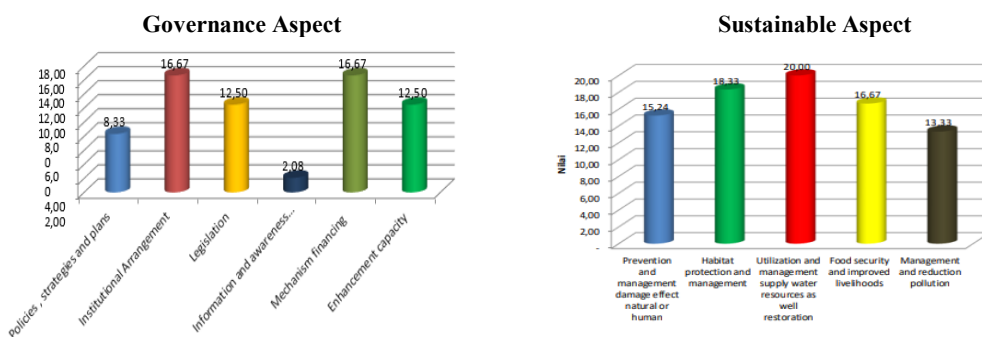


Fig.2. The graphic and gap between the governance aspect and sustainable development aspect.

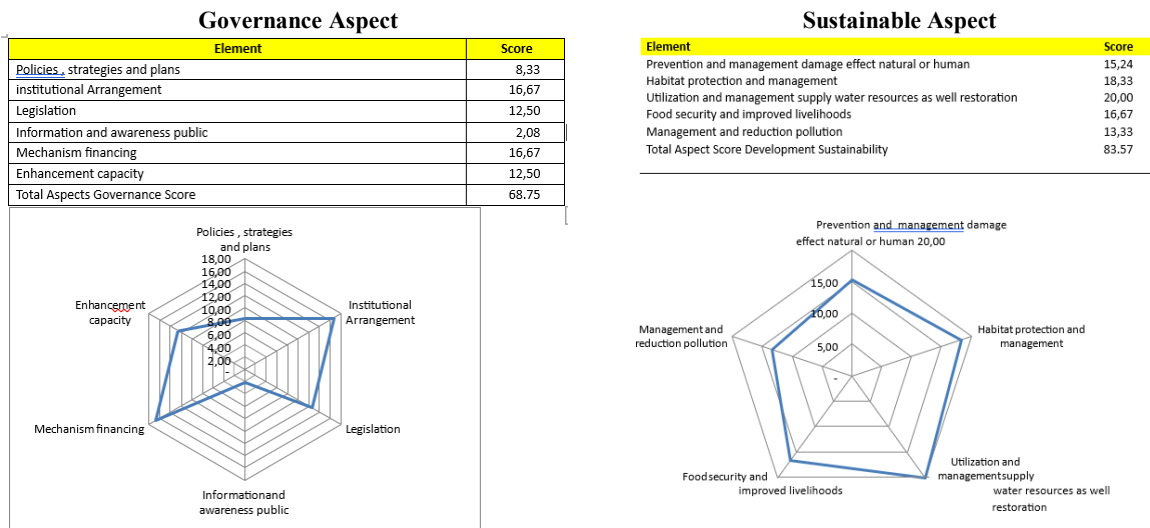


Fig 3. Result of the gap the governance aspect and sustainable development aspect

4 Conclusion

1. The governance aspects of integrated coastal and marine management programs emphasize institutional arrangements, legislation, and financing mechanism relatively good, while information and public awareness, Policies, strategies, and plans are still relatively lacking.
2. The aspect of sustainable development, integrated coastal and marine management programs emphasize food security and improve livelihoods, management and reduce pollution, utilization, and management of water resources and their restoration.
3. Overall, both from the aspect of governance and aspects of sustainable development, the status of the coastal area of Bontang City is in the good category.

References

1. BPS, Kota Bontang Dalam Angka (2021)
2. Wikipedia, Integrated Coastal Zone Management
3. R. Kay and J. Alder. Coastal Planning and Management (1999)
4. Chua, Thia Eng. Coastal Governance: A reflection of integrated coastal management initiative with special reference to East Asia Seas region, in Securing the oceans: Essay on ocean and governance – regional and global perspective (Global Environment Facility, Washington, DC, United States, 2008)
5. C. Thia Eng, B. Danilo, B.A. Nancy, P. Daisy Padayoa, Environmental Science, Geography (2006)
6. B. Barbara, Conservation, and Integrated Coastal Management (Coastal Governance, University of Rhode Island, 2003)

7. J. C. Sorensen, S.T. McCreary, Institutional Arrangement for managing coastal resources and environments, 2nd Edition. COAST. Renewable Resources Information Series (National Park Service, US Department of the interior, Washington, DC, 1990)
8. Chua Thea Eng. The dynamic of integrated coastal management: practical application in the sustainable coastal development in East Asia (PEMSEA, Philippines, 2006)
9. G.A. De Le, S. Levin, Ecology **1**, 3. (1997)