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Multilevel Management System for Coastal Areas by Network Governance

Takeshi Hidaka

Abstract

Coastal areas are a critical space for humans and other living things and must be properly managed. Coastal management is complicated by the diverse use of coastal areas by diverse individuals. The proposed method is integrated coastal area management that integrates various sectors. Satoumi has been proposed and practiced in Japan and is one of the voluntary coastal zone managements of shallow water. The author proposed a multilevel management system with Satoumi as a basic element. The multilevel management system manages the waters under the jurisdiction of prefectures through multistep efforts such as providing Satoumi, Satoumi networks, and administrative coastal infrastructure. The author also proposed that multistep efforts be bundled with network governance. In this report, after introducing the multistep management system, the efforts of coastal zone management in Shizugawa Bay and the coast of Kagawa Prefecture in Japan were evaluated as a multistep management system and network governance, and the characteristics and issues of each approach were extracted. Furthermore, the effectiveness of multilevel management systems and network governance were examined.

Keywords: coastal area, coastal management, integrated coastal management, Satoumi, network governance

1. Introduction

The coastal area, the sea area near the coastline or the land area, is a critical place for humans and nature. The coastal area is a shallow, accessible space for humans, that provides a calmer and more comfortable environment than inland. In nature, the coastal area is a spawning ground for aquatic products and larvae and a storage and supply site for nutrient salts and has a function of purifying water quality and the like. Such coastal areas should be properly managed [1].

However, because coastal areas are easily used by humans, they are used by various individuals in various ways, and there are various legal systems related to use and management. To properly manage coastal areas, it is necessary to coordinate such diverse uses and various legal systems and bundle them as a whole to achieve the management objectives [2]. Integrated coastal management (ICM) as a type of coastal management is a government-led management system that attempts to use the legal system. In the United States, the pioneer of coastal management, ICM is the center of coastal management, and the ICM system under the Magnuson Patrice Law of the Gulf of California is famous [3]. Partnerships in Environmental

Management for the Seas of East Asia, based in Southeast Asia, is attempting to promote coastal management under the ICM system [4].

By contrast, in Japan, the system for coastal management is not legalized, but projects for comprehensive management and initiatives for voluntary comprehensive management have been promoted. The concept of Satoumi is the basis of these efforts. Satoumi was defined by Yanagi [5] as “a coastal area where biodiversity and productivity have increased due to the addition of human hands.” Satoumi development is often voluntarily undertaken by local residents, including fishermen, and regarded as a voluntary coastal management initiative. I considered that a coastal management should be conducted by a combination of voluntary Satoumi development by local residents and public management by administrative agencies and proposed a multilevel management system based on network governance [6].

The purpose of this report is to evaluate the effectiveness of this management system. To do so, after introducing the basic structure of the multilevel management system and Satoumi in Japan, the management centered on aquaculture in Shizugawa Bay and the comprehensive management in Kagawa Prefecture are analyzed as case studies and evaluated from the viewpoint of a network system. Based on these examples, the effectiveness of the proposed system is examined.

2. Coastal management dynamics and multilevel management systems

2.1 Coastal Management Dynamics

The multilevel management system for coastal areas is a normative model proposed as a mechanism for managing coastal areas by combining various subjects and management methods based on the analysis results of precedent cases and management theory [6]. This idea is based on the dynamics of coastal management, where the complexity of use increases because of the expansion of coastal areas (i.e., land waterfront, coasts of municipalities, sea areas of prefectures, and sea areas beyond prefectures) and changes in organizational and management systems. Similarly, Ramkumar et al. have a dynamic view of coastal management. However, this is organized according to the relationship between the time axis and space, which is different from our method of organizing [7].

The coastal management system is expected to differ by the size of the target coastal zone and the complexity of its use. Therefore, the various efforts conducted in Japan (cases in which the author conducted a direct survey) are arranged in **Figure 1** and depend on the two axes of the target space expansion (scale) and the variety of usage. The horizontal axis is divided into Levels 1 to 4 according to the expansion of the space. The vertical axis is divided into three phases, single-phase, dual-phase, and multiphase, reflecting the variety of usage. Usage is relatively simple at Level 1, the narrowest sea level, and the diversity of usage increases as the target sea area expands. Therefore, the position of the example changes from the state in which the land of the fishing village in the lower left of **Figure 1** is used only for fishing, to the state in which the waters beyond the jurisdiction of the prefectures in the upper right of **Figure 1** are used in the most diverse form. The premise of the multilevel management system is that the management system changes accordingly.

2.2 Multilevel management systems

Based on the aforementioned dynamics of coastal management, using the implications from other studies and the analysis results of case management organizations and management methods at each level, based on the creation of Level 1

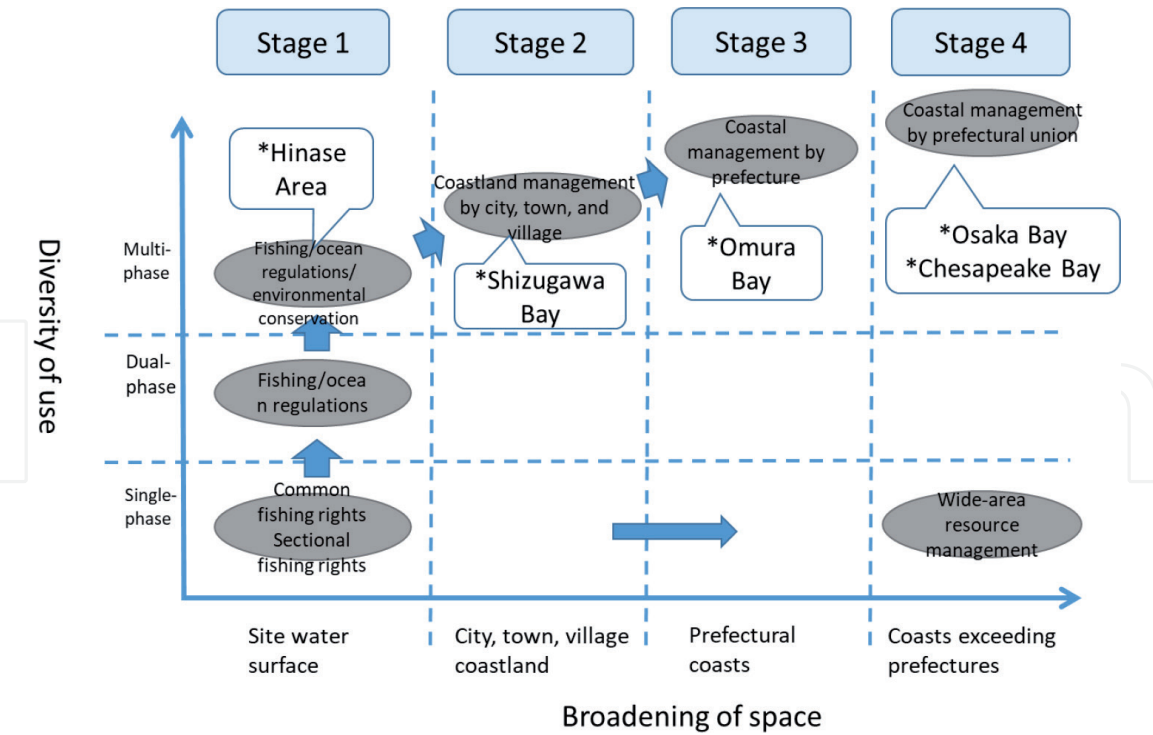


Figure 1. Coastal management dynamics (modified from Hidaka [6]). Note: “*” indicates cases investigated in this study.

Satoumi, in the Level 2 Satoumi network, we added the provision of coastal infrastructure at Level 3 and the cooperation of marine areas at Level 4, and the combination of these mechanisms was expected to create a coastal management system as a whole: This is the skeleton of a multilevel management system for coastal areas.

At Level 1, the Satoumi project is targeted toward activities where fishermen, users, other local residents, and municipalities are “closely involved in environmental conservation and resource management” in various locations [8]. These activities are conducted by the “whole of regional approach” [9], in which the local and regional individuals involved participate and cooperate.

At Level 2, the Satoumi network is added to refer to the state where the Satoumi projects that are held in various places are organically linked. If Satoumi is networked, a wider coastal area will be covered. For Satoumi to be networked, governments (prefectures, municipalities) and private organizations must support the Satoumi project and the cooperation between Satoumi [10].

At Level 3, the provision of coastal infrastructure (hereinafter, coastal infrastructure) will be added. Coastal infrastructure refers to administrative services provided only by the government, such as regulations for environmental conservation and resource management, and coastal conservation projects. Vertical administration is a problem in the provision of coastal infrastructure, which is efficient because of a “whole of government approach” [11, 12], which is an inter-agency approach.

In other words, at Level 3, Satoumi development, a Satoumi network, and coastal infrastructure is provided collaboratively. The combination of these three efforts at Level 3 enables coastal management in the waters under the jurisdiction of prefectures, which is the basic scope of coastal management.

In a wide area beyond the jurisdiction of the Level 4 prefectures, the related prefectures collaborate through the intermediary of the country to provide coastal infrastructure in common, and Satoumi development and a Satoumi network proceed according to the situation.

The outline of the efforts for each level is shown in **Figure 2**.

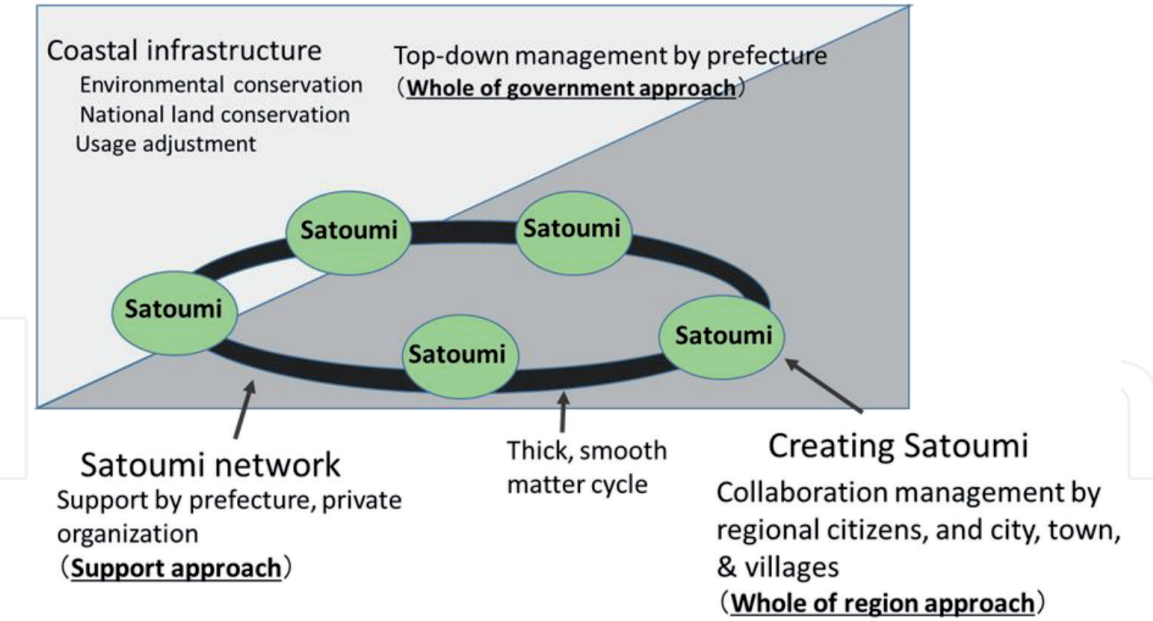


Figure 2.
Basic configuration of the multilevel management system (modified from Hidaka [6]).

The square in the background of **Figure 2** shows the ratio of involvement in management. The management of coastal areas involves the state, prefectures, municipalities, and users. Their roles can be roughly divided into sea area cooperation, provision of coastal area infrastructure, Satoumi network, and Satoumi development. Management bodies are divided into governments (countries, prefectures, cities, towns, and villages) and users (e.g., local residents, fishers), and the decision-making level is hierarchized from a high level that determines policies and systems to the decision-making level of daily activities on site. When arranged side by side, government and private decision-making ratio becomes the rectangle that is the background of **Figure 2**. The left side of the diagonal line is the government's area, and the right side is the user's area; the position of the intersection of the horizontal line and the diagonal line shows the decision-making rate of the government and the user. In other words, the lower the Figure, the higher the user's involvement, the center of the Satoumi project, and its network; the government of the coastal infrastructure is located on the upper side of **Figure 2**.

2.3 Network governance

As described, the multilevel management system comprises a combination of various subjects and a plurality of different managements. Therefore, for this system to operate effectively, a philosophy and process are necessary. Because this management organization is a network type, the idea of network governance was adopted as its philosophy. Network governance is "interfirm coordination that is characterized by organic or informal social system, in contrast to bureaucratic structures within firms and formal relationships between them" [13]. Then, it is explained as "a mode of governance in which stakeholders who possess various resources necessary for governance in the form of a network are integrated, and problem solving is conducted through the process of interaction between those actors" [14]. In other words, a single manager does not govern from the top down; by contrast, the related organizations work together to perform bottom-up governance. In a multilevel management system, the concept of governance is applicable because the contents are not the management by a specific manager but the combination of managements performed by various actors.

Item	Content
Network organization	Formation of network organization with diverse and pluralistic entities involved (composition of council)
Collaboration process	Democratic process involving diverse and pluralistic entities involved (principles of operation of the council)
Equality with the government	Equality role division of government (country, prefecture, municipality), local residents
Multilayer structure that connects different scales	Multilayered organizations and institutions that connect multiple levels, local, national, regional, global (stratification)
Purposing postulate on sustainability	Dropping into the purpose of sustainability criterion, adaptive management process using it

Table 1.
Standards that a multilevel management system should have, based on network governance.

Based on studies of network governance theory and environmental governance theory, five criteria, namely, the network organization, process, equality with the government, multiple layers including different scales, and the aim of the postulate of sustainability were arranged (**Table 1**).

3. Satoumi

The Satoumi is the most basic component of a multilevel management system. The Satoumi proposed by Yanagi is defined as “a coastal area where biodiversity and productivity have increased due to the addition of human hands” [15]. The inspiration for definition is said to be that the forests near the village are maintained by management, such as logging and thinning, by individuals living in the village. In contrast to the conventional belief that no human intervention is required to preserve the marine environment, Dr. Yanagi presented the idea that proper human involvement improves the environment. To prove this idea, Dr. Yanagi searched for cases in various parts of the world and attempted to construct a theory to support it. Examples of demonstrations include the thinning of seaweed beds and traps made of stone walls. The theory is that the biota does not have extreme polarities; instead, there is an optimal relationship between the amount of nutrients and fish resources, and manual maintenance of the appropriate levels of nutrients is required. Recently, the results of a comprehensive investigation into the character of Satoumi under the direction of Dr. Yanagi were reported [16].

The concept of Satoumi proposed by Dr. Yanagi was implemented measures by the Government of Japan in the latter half of the 2000s, for example, the 21st century environmental strategy and the Basic Law of the Sea. Furthermore, the concept of Satoumi was incorporated into coastal management policies by prefectures and municipalities. Notably, the private sector is working on an increasing number of cases to implement Satoumi. According to the author’s research, there were approximately 240 cases in 2015 [17], and according to a survey by the Ministry of the Environment, in 2018, there were 291 cases.

Many researchers other than Mr. Yanagi have studied how to manage Satoumi or how to create Satoumi, and the contents of the efforts are evolving, even in the field. Based on these studies, we assess the contents of the Satoumi management that is currently envisioned according to Hidaka [18].

The creation of Satoumi is called Satoumi creation or Satoumi management. The main actors of such activities are local individuals such as fishermen. A council is

formed of various local stakeholders, groups, and organizations that centers on fisheries cooperatives and local governments and becomes the management body [17]. For this reason, the conference not only decides the contents of Satoumi management and implements it but also serves as a platform for the participation of various stakeholders and has the role of promoting communication among the participants.

The target of Satoumi management is the shallow area along the coast of the area. This phenomenon is because the individuals involved have the same physical and biological conditions on the land. Instead, the Satoumi cannot cover a large area. Therefore, a Satoumi network must be formed in cooperation with the Satoumi formed in the neighborhood. This network may be formed not only with Satoumi but also with Satoyama, which is woodland close to the village. What is essential is to cover the important points of the material cycle by forming a network. It may also cover the distribution and migration of living things.

In this Satoumi, management activities are conducted, such as preserving and creating the environment of the target sea area, maintaining and increasing fisheries resources, and making rules for use: This is Satoumi management. Unlike conventional fisheries rights management, Satoumi management includes activities not necessarily directly linked to fisheries, and those activities are conducted by applying scientific evidence and making objective observations. The introduction of new technology is also expected. At this time, the existence of scientists closely related to the region is essential because they enable science-based management. In addition, individuals who live outside the area and those who support activities while outside the area are also important players in management. For this reason, the value of the relationship that connects these individuals with Satoumi and the mechanism to realize it is crucial [19].

Additionally, the educational effect of participating in activities as the effect of Satoumi has attracted attention [20]. The literature has observed that not only did the students who participated in the Satoumi project increase their awareness of the region and the environment, but it was also effective for the parents of the students and the fishery personnel who supported the activities.

Furthermore, attention is being paid to the economic effects of Satoumi. From the beginning, an assumption has been that fishery production will be improved by preserving the environment and recovering fishery resources. In addition, educational tourism and marine tourism that participate in the creation of Satoumi are expected to be new economic activities, and a system has been established in which consumers outside the region purchase marine products produced in Satoumi as environmental products. This effort is also to realize the value of the relationships aforementioned.

As mentioned above, the multilevel management system is constructed with the Satoumi as the most basic element. Such Satoumi is formed in the shallow waters of various places, they are networked, and the coastal infrastructure is superposed on Satoumi and their networks to manage coastal areas.

In the following chapters, the cases of Shizugawa Bay, managed in the waters of municipalities, and Kagawa Prefecture, managed in the waters of prefectures, are analyzed from the perspectives of multistep management systems and network governance.

4. Case studies

4.1 Case study multilevel management in Shizugawa Bay

Management of Shizugawa Bay is an example of the practice of Satoumi development and a Satoumi network along the coast of municipalities [21].

Shizugawa Bay is a small open bay on the Sanriku coast of eastern Japan. On the coast of Shizugawa Bay, there are three fishing areas with different characteristics: Tokura area, Shizugawa area, and Utatsu area, where oysters, squirts, coho salmon, and seaweed are cultivated and abalone and sea urchin fisheries are conducted under deferent management ways. Large-scale reconstruction activities are under-way in this area because coastal villages and fishing facilities were destroyed by the 2011 Tohoku Earthquake tsunami (**Figure 3**).

Aquaculture in Shizugawa Bay is conducted based on the aquaculture and fishing rights stipulated by the Fisheries Law. The owner of the fishery is the Miyagi Prefectural Fisheries Cooperative. However, a group of fishermen is formed at each of the branches—the Shizugawa branch, Tokura branch, and Utatsu branch—which are the branches of the fishery cooperative, and the actual detailed fishing ground management is performed by each group. This group of fishermen has high character and independence due to differences in the fishing ground environment caused by the historical background and topography of the area where they are based. For this reason, the rules for exercising the fishing grounds are independently decided within each group, and execution management is also performed. This voluntary management of fishing grounds is also important when considering Satoumi management.

Before the earthquake, there were problems such as overcrowding and illegal use of licensed fishing grounds, but after the earthquake, significant improvements have been made in each area. For example, rearranging of aquaculture rafts by the flow of seawater or limiting the total number of rafts to determine the number of rafts per person. In the Tokura area, aquaculture management has been optimized by the drastic reduction of aquaculture density and the introduction of restrictions on the type and amount of aquaculture per capita and has achieved Aquaculture Stewardship Council certification. As a result, the fishing ground environment has been significantly improved in each area, and fishery productivity is also increasing. Based on the aforementioned information, Satoumi is formed in each of the three areas of Shizugawa, Tokura, and Utatsu in Shizugawa Bay and is properly managed for each Satoumi.

In addition, before the Great East Japan Earthquake, because the areas were highly independent, they were managed only by the fishermen, without

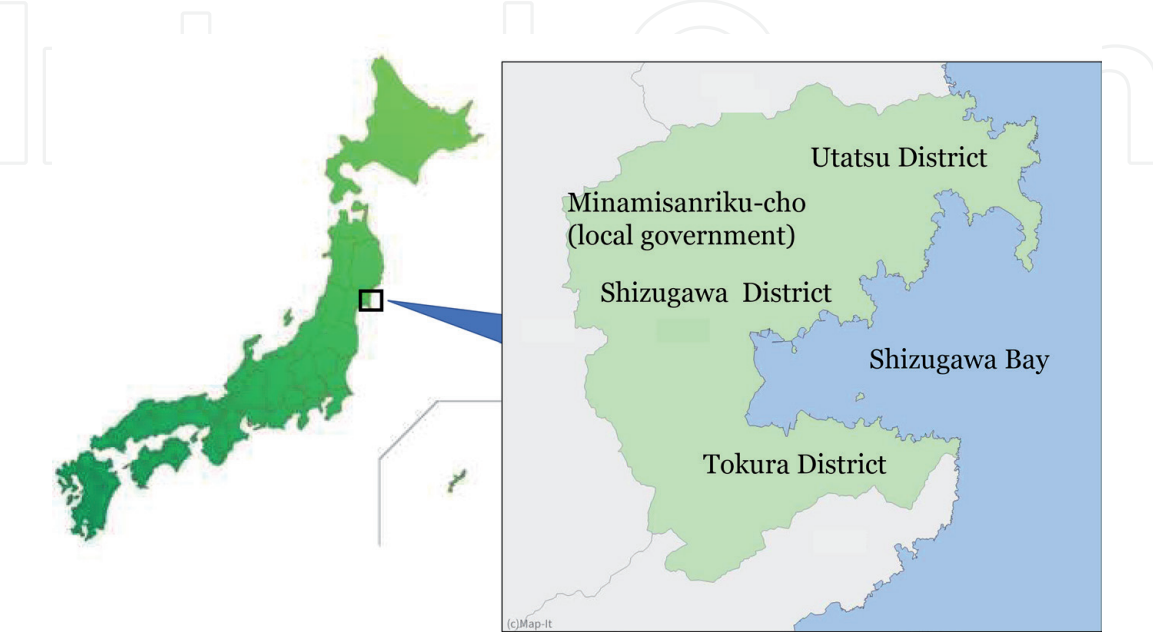


Figure 3.
Location of Shizugawa Bay.

coordination with neighboring areas. However, after the Great East Japan Earthquake, the “Council for Thinking about the Future of Shizugawa Bay” was formed as a consultative organization with various stakeholders and researchers including Minamisanriku Town, a local municipality centered around fishermen. As a result, the management of Shizugawa Bay as a whole is now considered. In addition, a project of the Ministry of the Environment has conducted physico-chemical research such as nutrient salt circulation in Shizugawa Bay, and discussions on research studies have been regularly held at the council meetings. As a result, aquaculture management, such as regulation of aquaculture density and facility allocation, has been conducted based on scientific knowledge, and the layout of aquaculture rafts has also been conducted in consideration of the flow of seawater and nutrients throughout the bay. In this manner, although Satoumi in Shizugawa Bay is voluntarily managed by a group of fishermen, it is now managed based on scientific knowledge together with scientists and local stakeholders, and cooperation between adjacent Satoumi is also considered.

By contrast, in Shizugawa Bay, in addition to aquaculture, it is used for sightseeing and nature experiences. Shizugawa Bay has many tourist resources, and approximately 900,000 tourists visit the site each year. Many of the tourism resources are related to fisheries such as recreational fishing, experiential fishing, sightseeing in the bay, and marine-related activities such as scuba diving and sea kayaking, and the demand for marine and environmental education is increasing. Such tourism use of Shizugawa Bay is promoted by the Minamisanriku Town Tourism Association, and many fishermen participate as individuals. However, the management of Shizugawa Bay is not linked to tourism promotion, and there is no organization or plan to consider it.

In addition, Minamisanriku Town has a nature center preparation room (a city agency) for studying conservation and utilization of nature and a visitor center (national and prefecture agency) for introducing the nature and culture of the coast, promotes nature conservation, and has several non-fishery organizations related to Shizugawa Bay, such as nonprofit organizations that support utilization efforts. However, such conservation activities of the natural environment that are not directly related to aquaculture are not linked with the management of Shizugawa Bay.

Notably, although Shizugawa Bay has many regional resources and related organizations, management of Shizugawa Bay is biased toward aquaculture, and a system for comprehensive management of Shizugawa Bay has not been established. To improve this, registration as a seaweed bed in the Ramsar Convention Wetland Register in October 2018 was of great significance because tourism and nature conservation are subject to management, centering on aquaculture and fisheries. Currently, NPOs considering the management of Shizugawa Bay are taking the lead, and efforts are underway toward the comprehensive management of Shizugawa Bay based on the Ramsar Convention.

Based on the aforementioned information, **Table 2** summarizes management efforts in Shizugawa Bay according to the structure of the multistep management system. We summarized the evaluation of Shizugawa Bay management as a multi-level management system, an individual Satoumi centered on aquaculture management has formed in three areas, and the entire bay is managed by networking them. The problem that the utilization of local resources other than aquaculture is not included in the development of the Satoumi in each area and the “regional approach” is weak, and there is the problem that the management of the bay and the provision of coastal infrastructure by the Miyagi Prefectural Government are not linked. Furthermore, the three Satoumi networks have just begun. However, an expectation is that these problems will be resolved by the networking efforts triggered by the registration with the Ramsar Convention.

Management function	Content of management	Management entity
Alliance of prefecture		
Coastal infrastructure	• Basic plan of coast conservation in Miyagi prefecture	Miyagi Prefecture
	• Sanriku Reconstruction National Park	
	• Conservation of wetlands by registration of the Ramsar Convention	
Satoumi network	• Supported by the Nature Center Preparation Office	Minamisanriku-cho
	• Council for enforcement of the Ramsar Convention	
Satoumi	• Fishery utilization plan	Shizukawa branch
	• Effective management of aquaculture at the Shizukawa district, Tokura district and Utatsu district, particularly AFC by Tokura	Togura district
	• Many participants to experience fishing, tourism fishery	Utatsu district
		Tourist Association

Table 2.
Evaluation of Shizugawa Bay management as a multilevel management system.

Next, the management of Shizugawa Bay was evaluated based on the five criteria of network governance.

1. Regarding the network organization, Satoumi was traditionally conducted only by the fishermen’s group, but recently, local stakeholders and researchers have joined as advisors. Additionally, if the cooperation between Satoumi and the participation of non-fishermen, which is currently underway, is achieved, it will be able to be evaluated as a network organization. It is still in the formation process.
2. The collaborative process plays a role as a forum for related parties to discuss topics in the “Shizugawa Bay Thinking Council.” The goal is that this council will be a place for collaborative processes when the parties involved in non-fishery utilization participate.
3. Regarding equality with the government, because this Satoumi project is based on fishing rights, the branch of the fishery cooperative, which is the subject of rights, and the local municipality, Minamisanriku Town, are equal. However, the relationship with Miyagi Prefecture, which provides coastal infrastructure, is unclear, and equality cannot be evaluated.
4. Regarding the multilayered structure including different scales, we divided it into two stages: Satoumi, which manages each area, and a Satoumi network, which manages the entire Shizugawa Bay. By contrast, seawater and nutrients are flowing into the Shizugawa Bay from the waters outside the bay, and cooperation with the waters outside the bay should be considered. However, this area is off the coastal area covered by Satoumi, which is a management area of Miyagi Prefecture. Collaboration with Miyagi Prefecture should be but has not been fully considered in terms of multilayering.
5. Regarding the purpose of the sustainability standard, the viewpoint that Shizugawa Bay as a whole should aim for this is not defined; thus, this viewpoint

is absent. This absence is because the management of Shizugawa Bay is an accumulation of individual Satoumi management. Currently, the “Council to think about Shizugawa Bay” is working to establish cooperation between the Satoumi, and with the registration of the Ramsar Convention, the entire Shizugawa Bay has begun to be discussed. If this discussion goes well, the expectation is that the sustainability standard will be considered in this criterion.

As described, when the management of Shizugawa Bay was evaluated as network governance, we observed that standards 4 and 5 have not been achieved. The reason for standard 4 is that although the management of the coasts of municipalities has been implemented, cooperation with wider sea areas is necessary even when considering the coasts of municipalities. As for standard 5, there are various uses even in a narrow sea area; thus, sharing the purpose of cooperation of stakeholders is necessary. An expectation is that this will progress in response to the Ramsar Convention.

4.2 Case study multilevel management in Kagawa Prefecture’s coast

Management in Kagawa Prefecture was used as an example of the development of Satoumi, a Satoumi network, and the provision of coastal infrastructure in the administrative waters of prefectures [22]. In Kagawa Prefecture, the coastline faces the Inland Sea, including the two open seas, the Sea of Harima and the Sea of Hiuchi. The prefecture has approximately 100 large and small islands with a total coastline of approximately 722 km, the fourth-longest coastline in Japan after Nagasaki Prefecture. In addition, the prefecture area is long in the east and west along the Seto Inland Sea, and even at the longest in the north and south, it is only approximately 30 km and is closely related to the Seto Inland Sea.

Environmental changes in the Seto Inland Sea occurred during the period of high economic growth in the 1960s and 1970s. During that period, industrial development and population growth increased the inflow of drainage from land, increased landfill on the sea surface, and caused the disappearance and modification of shallow water. As a result, the quality of water and the occurrence of red tide caused substantial damage to organisms. To solve this problem, the Seto Inland Sea Environmental Conservation Temporary Measures Act was enacted in 1973; in 1978, it became a permanent law as the Seto Inland Sea Environmental Conservation Special Measures Law (hereinafter referred to as the Setouchi Law).

Regarding the current coastal environment, Kagawa Prefecture has the following five problems (Kagawa Prefecture 2013) [23]: (1) organic pollution that does not show any improvement (Chemical Oxygen Demand environmental standard achievement rate of 40%), (2) disruption of the circulation balance of nutrient salts (occurrence of discoloration of cultured seaweed), (3) seagrass beds that tend to increase but are still small, (4) sea litter that requires immediate attention, and (5) the diminishing relationship between individuals and the sea (**Figure 4**).

In 2012, Kagawa Prefecture made Satoumi development a pillar of its environmental policy in the Seto Inland Sea and added it as a priority policy in 2013. Based on this policy, in April 2013, the “Kagawa ‘Satoumi’ making council” (hereinafter “council”) was established to cover group organizations that may be related to Satoumi and coastal zone management. Since then, this council and its working groups have played an important role. In the council, the working group led the creation of the “Kagawa ‘Satoumi’ vision (hereinafter “vision”), adopted as a pillar of Kagawa Prefecture’s environmental policy in Setouchi. Since then, various projects and activities have been implemented based on this vision.

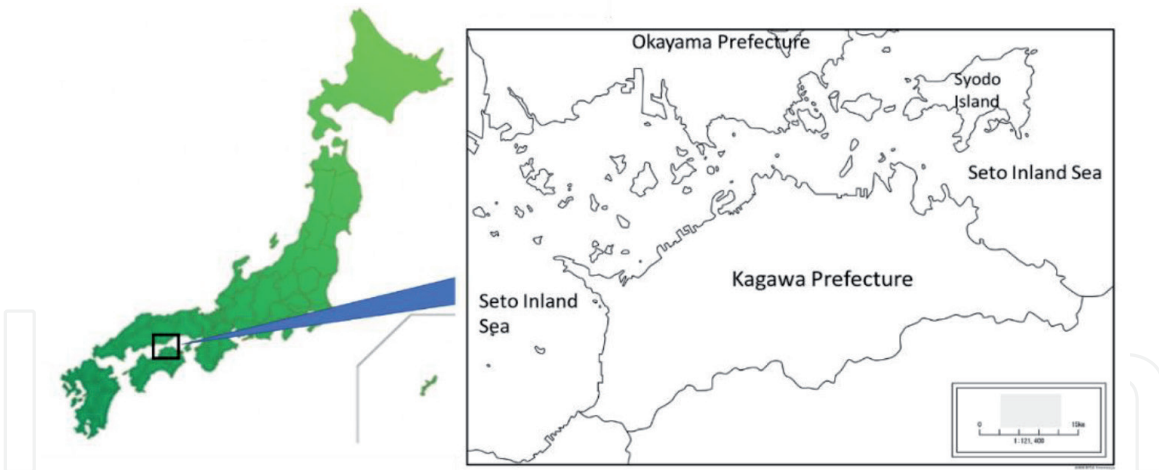


Figure 4.
 Location of Kagawa prefecture and the coastline.

The basic idea of the vision is to create “a sustainable and rich sea where individuals and nature coexist.” The council and the prefecture call it Satoumi-zukuri. Additionally, as a basic policy of the activity, “the whole prefecture connects all the citizens of the prefecture to connect the mountain, the river, the town, and the sea.” In other words, the purpose of the activity policy is to link various stakeholders, activities, and networks.

Based on this basic philosophy and activity policy, to promote initiatives, six points were set: (1) construction of a promotion system, (2) prosperity of common principles and efforts, (3) fostering awareness, (4) human resource development, (5) networking, and (6) adaptive management based on data. Various businesses are attached along these points.

The distinctive feature of the vision-based business is that it is not providing infrastructures that the prefecture directly implements, such as a coastal conservation facility construction business, but practices and ingenuities such as an event or program involving the related organization and prefectural individuals. This measure includes projects that support such software projects. In the activity policy, this will enable all the citizens of the prefecture to conduct activities to use the sea and to conserve it, and to connect businesses that were previously individually conducted in the mountains, rivers, villages, and the sea. For example, in the sea litter reduction project, not only other departments in the prefectural office related to sea litter but also basin municipalities and coastal municipalities have implemented measures cooperatively, for example, activities such as supporting the creation of Satoumi in the area and with related parties.

Regarding the measures that the prefecture should implement as a project under direct control or as a supervisor (not a supporter), we referred to the “Kagawa Prefecture Plan for Environmental Preservation of the Seto Inland Sea” (hereinafter referred to as Kagawa Prefecture Plan), formulated based on the Setouchi Act. This plan summarizes the matters to be performed by the departments of the prefectural office. Regarding the promotion, we supposed that a study of the prefectural office would be across departments. The contents of the Kagawa Prefecture Plan correspond to the coastal area infrastructure and are being tackled as a “whole government approach” beyond the boundaries of departments within the prefectural office.

In addition, Kagawa Prefecture incorporated the vision’s activity policy and activities into the contents of the Kagawa Prefecture Plan when it was revised in

2016. As a result, the Kagawa Prefecture Plan integrates the hardware business conducted by the prefecture with the software business conducted by groups and citizens or their support projects. In the Kagawa Prefecture Plan, the council continues to play an important role in creating Satoumi, which was the content of the vision, and the prefecture is responsible for other things.

As aforementioned, this council covers all group organizations that may be involved in Satoumi and coastal area management in Kagawa Prefecture, and 21 groups are members. Although the resolution of the council has no legal effect, it represents the agreement of the parties concerned with the creation of Satoumi in Kagawa Prefecture. The council is working groups of experts in specific fields and has experts as advisors. Currently, there are three working groups, Satoumi Vision, Satoumi Experience, and Satoumi Circulation, which support the creation of Satoumi.

In this manner, the promotion system for business and activities based on the vision is a system in which the prefecture and the prefecture collaborate to promote the vision, rather than the prefecture determining the vision and achieving it from the top down, and support the realization and cooperation of prefecture projects. For the region, the prefecture does not promote business but supports the activities onsite through working groups. Thus, the author referred to Kagawa Prefecture's efforts to create Satoumi a supportive or supportive approach to top-down management.

As the authors observed, the management of coastal areas in Kagawa Prefecture has been conducted in collaboration with the private sector and prefectural government (the former vision), as well as the hardware projects and regulation/management efforts that the prefecture should conduct (former Kagawa Prefecture). In other words, the characteristic of coastal area management in Kagawa Prefecture is that it is integrated under the current Kagawa Prefecture Plan; the former is an effort to support the development of Satoumi and the Satoumi network, and the latter is to provide coastal infrastructure. Therefore, multilevel management in the coastal area of Kagawa Prefecture is being constructed in the Kagawa Prefecture Plan. **Table 3** summarizes the contents of multilevel management.

Next, we evaluated network governance.

1. Regarding the network organization, the vision's activity policy is to connect various stakeholders and activities; thus, this is reflected throughout vision's activities. In particular, the council, the center of the vision, has the characteristics of a network organization because it comprises voluntary participants and the members have equal, mutual relationships.
2. In the consultation process, a forum for consultation by various parties is established based on this meeting. In particular, the working group is a forum for discussions on specific themes.
3. Equality with the government is also secured because the old vision formulated by the council and the old Kagawa Prefecture Plan created in Kagawa Prefecture are integrated in the current Kagawa Prefecture Plan.
4. Regarding the multilayered structure including different scales, it has a three-level structure of Satoumi (shallow sea), Satoumi network (coast of municipalities), and coastal sea area (coast of Kagawa Prefecture). However, we cannot call it a multilayered management structure because there are few efforts by Satoumi.

Management function	Content of management	Management entity
Alliance of prefecture	<ul style="list-style-type: none">Basic plan for environmental conservation in the Seto Inland Sea	National Government
Coastal infrastructure	<ul style="list-style-type: none">Kagawa Prefecture Plan for Environmental Conservation in the Seto Inland Sea	Kagawa Prefecture Government
Satoumi network	<ul style="list-style-type: none">Prefectural office study meeting for Kagawa Prefecture Plan	Kagawa Prefecture Government
	<ul style="list-style-type: none">“Kagawa’s Satoumi Creation” prefectural office study meeting	Related municipalities
	<ul style="list-style-type: none">“Kagawa’s Satoumi Creation” council	Non-profit organizations
	<ul style="list-style-type: none">Kagawa Satoumi University	
	<ul style="list-style-type: none">Satoumi Concierge	
Satoumi	<ul style="list-style-type: none">Ogoshi area base field	Related municipalities
	<ul style="list-style-type: none">Miyagawa area basin matching	Fisher’s organizations
	<ul style="list-style-type: none">Citizen participation monitoring (live creature survey)	Non-profit organizations Citizen’s groups

Table 3.
Contents of coastal management in the Kagawa coastal area.

5. Regarding the purpose of sustainability standards, although a qualitative catchphrase has been reached regarding the creation of Satoumi, concrete indicators have been set for “beautiful seas” and “sea of diverse biodiversity.” However, there is a problem that the indicators show individual conditions such as water quality. Thus, we recommend improving the index to demonstrate the condition of the entire coastal area of Kagawa Prefecture.

Overall, (1) to (3) of the five criteria are satisfied because the vision focuses on these criteria. Although (4) and (5) are inadequate, we posit that these items are working toward their achievement. Therefore, our evaluation is that the structure of network governance is being prepared.

5. Conclusion

The coastal multilevel management system aims to manage prefectural waters by providing Satoumi, Satoumi networks, and coastal infrastructure, with Satoumi as a basic element. In wide-area waters that exceed prefecture waters, management is performed by sharing the provision of coastal infrastructure by prefectures. This system is a normative model constructed from partial precedents and management theory, and it is necessary to repeat empirical analysis to improve the effectiveness of the model.

The cases in this report are Shizugawa Bay and Kagawa Prefecture. In Shizugawa Bay, management is performed mainly in the creation of Satoumi in a small bay on the coast of the municipalities. In the case of Kagawa Prefecture, Satoumi creation, a Satoumi network, and provision of coastal area infrastructure are comprehensively conducted as a prefecture plan in prefecture waters. Both cases have advantages and disadvantages and are imperfect examples of each stage. However, by understanding each approach as a multilevel management system, we evaluated the advantages and disadvantages of the approach, and was able to roughly infer

the effectiveness of this system. Ideally, if the efforts toward Satoumi creation and Satoumi networks such as Shizugawa Bay are combined with Kagawa's comprehensive management of public and private activities and hardware and software projects, a multilevel management system in coastal areas of prefectures will be completed. Notably, the analysis of partial precedents must be repeated. As a result, we will be able to confirm the effectiveness of this system.

The proposal by Hidaka [6] was that network governance can be achieved when the aforementioned five criteria are fulfilled. According to this report, network governance has been achieved at a certain level in Kagawa Prefecture. What remains in Kagawa Prefecture is the development of an ideal state that summarizes the state of the entire coastal area and an index that represents it. The effectiveness of network governance is proved when it has been proved that the whole coastal area reaches the ideal state when the network governance is executed. In that sense, we recommend developing an index that represents the state of the entire coastal area in Kagawa Prefecture.

A limitation of this report is that a wide area outside the jurisdiction of prefectures was beyond the scope of our investigation. In Japan, although pioneering projects are underway in, for example, Tokyo Bay [24] and Osaka Bay [25], there are few cases, and the analysis of actual conditions has been delayed. Thus, further research should analyze the content and results of these efforts. In the United States, the Chesapeake Bay is under interstate coastal zone management efforts [26]. Accumulation of such cases is required for further research.

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