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Who Manages Space? Eco-DRR and the Local Community

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Abstract: The notion of ecosystem-based disaster risk reduction (DRR) has only recently emerged in Indonesia. The Indonesian central government now adopts some policies related to ecosystem-based DRR with formal commitments from local administrations. At the implementation level, various activities have taken place, such as mangrove planting and restoration along the coastline to address the rising sea level and the "one billion trees" program to address the urgent issue of deforestation. These governmental activities have involved local communities that reside in the high-risk area, while nonlocal actors, particularly from the private and the nongovernmental sectors, have contributed as a third element to development. This paper examines space management in the context of Eco-DRR, paying special attention to uncertainty and anxiety in the local communities as the government and private sectors engage in development activities that have significant impacts on their present and future lives. The present study pursues this purpose by means of in-depth interview and focus group discussions (FGD) with local leaders in mangrove planting and restoration programs. The study took place in a small island community in a part of the Jakarta Megapolitan Region, Indonesia. The results point out that the community feels left behind due to lack of trust in managing the conservation space. Another issue to be addressed is how to improve the democratization of environment management and livelihood base of the local community. Therefore, building confidence and ameliorating relationships between actors within/without the local community should lead to a better Eco-DRR initiative.

Keywords: coastal community; disaster risk reduction; ecosystem; governance; mangrove resilience; participation

1. Introduction

Indonesia has vast potential for its mangrove forests, which is reported to be as large as 9,204,840.32 hectares. The current state of the country's mangrove forests can be broken down into the following categories: good condition (27%), poor condition (48%), and damaged condition (23%) [1]. Known as the most productive ecosystem on earth, mangroves inhabit the brackish water along the subtropical and tropical coast [2,3]. As an ecosystem, mangroves stabilize coastal waters by shielding the coastline from flooding, controlling the erosion rate, acting as a filter to toxic materials, and providing spawning and shelter areas for various forms of marine life [4]. In addition, mangrove forests offer numerous products, for example tannins, wax, honey, and timber [5]. The aesthetic, historical, and cultural value of these forests are also an important consideration [6].

Recent studies have shown that mangroves are declining at a distressing rate worldwide, with a 25% global reduction in their population level. Compared to the 1980s, mangrove coverage today is no more than 15 million hectares [7]. The record also shows a disturbing amount of mangrove loss in Indonesia, with this country experiencing a high rate of mangrove disappearance. Recent research

shows that the rate of loss is up to 2% per year, which is higher than the mangrove loss rate in other countries [8,9].

Regardless of their importance, mangroves are seen as having low economic value in both the private and public realm. This commodity faces high pressure, including pollution, deforestation, and sea-level rise [10]. Indeed, the 2004 Tsunami that hit Aceh was a wake-up call to the country on the importance of mangroves. Before the devastating event, mangrove ecosystem services were rarely considered to be important in Indonesia. Mangroves were also largely neglected in all the policy discussions about illegal logging, land use and land cover change (LULCC), and global warming. For example, the economic value of mangroves that had been estimated using willingness to pay (WTP) was critically undermined [11]. The research suggests that a fisherman has to spend an estimated cost up to US$9 USD for mangrove reforestation and US$1.5 USD for the coral reef. Meanwhile, the number addressed to the nonfishermen relatively low. Nonfishers agreed to pay $1 USD for seagrass and $0.5 USD for the maximum spending. Therefore, mangroves are unrecognized compared to seagrass and coral reef. A new paradigm on mangrove management was introduced. Mangrove forests have been recognized more as people started to comprehend their value to the sustainable environment and the economy.

As the key actors in handling and governing coastal zones in Indonesia, the Ministry of Marine Affairs and Fisheries (MMAF) Republic of Indonesia offers core activities in sustaining mangroves [12]:

(1) Identifying mangrove degradation and planning for coastal rehabilitation. This is an activity to address the impact of the changing climate and restoring the coastal ecosystem in Indonesia.
(2) Community based mangrove reforestation. Known as "Ayo Tanam Mangrove" (Let's Plant Mangrove), this is a national movement on mangrove reforestation by means of increasing public awareness. Through the ministry, the government has provided approximately 10 million seedlings, involving local communities as the main driver.
(3) Establishing a mangrove learning center. The aim of this is to provide a knowledge center on coastal vegetation nurseries and management. Specifically, it focuses on learning how to reduce the low survival rate among vegetation seedlings.

This study focused on the second core of the activity by MMAF, which is the community-based mangrove planting initiative. The rationale for this program was the notion of managing natural resources in the community (CBNRM). In general, community-based activities rely on the ability and potential of local communities to participate in attaining the target of vigorous activity, including resource identification and the identification of and planning for sustainable management practices regarding their surrounding ecosystem [13–15].

The study location was in Kepulauan Seribu, Indonesia. Kepulauan Seribu, translated into English as "The Thousand Islands", is an archipelago located two hours from the port of Jakarta. The name derives from the 125 small coral islands with an elevation of no more than 2 m. The islands are distributed along the north of Jakarta Bay in the Java Sea and lie about 70–80 km to the north. This area was organized as a new "kabupaten" (district) in the Daerah Khusus Ibukota (Capital Special Region) of Jakarta in 1999 after administration reform. It is now home to 200,000 residents, consisting of two subdistricts and six villages. Though the environmental quality is generally declining, Kepulauan Seribu is well known for its marine resources (coral reefs, sea birds, and turtles). The proximity to Jakarta makes these islands popular among domestic tourists for their beaches, seaweed, and ecotourism based on mangroves [16–18].

Ecotourism is the main source of livelihood for the residents, in addition to small-scale fisheries. The islands provide outdoor experiences for domestic tourists and is an important part of the region's economy. However, continuous anthropogenic activity and climate change have exposed the area's vulnerable ecosystem. Climate change is predicted to affect the inhabitants of small islands such as Kepulauan Seribu [19]. The islanders see some signs of climate change. The symptoms are rising daily temperature, rainfall intensification (average daily precipitation), as well as sea-level rise. As evidence

of this, there were two severe floods in 2001–2002 and 2008–2007 that were the result of intense rain, which was worsened by sea-level inundation in the settlement area [20].

These two hydroclimatic disasters served as an entry point in restoring and mangrove reforestation. These activities have attracted a large number of participants, ranging from tourists to members of the private sector. They are eager to take part in these risk-reduction activities. One of the notable activities by the private sector was conducted by Toyota Indonesia, which has sponsored the planting of approximately 700,000 mangroves in the previous five years.

Apart from the monsoons and extreme hydroclimatic events, a significant factor in the changing of the coastal ecosystem in Kepulauan Seribu is human activity. In the past 30 years, coral reefs of Jakarta Bay have become more and more deteriorated and weakened by polluted water from the outlets of three rivers of Jakarta (Angke, Ciliwung, and Citarum Rivers). The Cisadane River, sourced from Banten Province, also contributes to this [21,22].

The ecosystem delivers its services to reducing risk in two important ways. A healthy and appropriately managed ecosystem will be able to deliver natural protection and can enhance the livelihood resilience of hazard-prone communities [23]. The ecosystem for disaster risk reduction (DRR) and climate change adaptation (CCA) has been advocated in a number of leading journals, particularly for coastal systems. In this article, the definition of ecosystem based disaster risk reduction (Eco-DRR) is a set of activities related to sustainable management, conservation, and restoration of the ecosystem to reduce disaster risk and/or to adapt to the consequences of climate change [24,25].

Further, Eco-DRR aims to achieve sustainable and resilient development. However, investing in the ecosystem should not be viewed as a single solution to risk reduction. The activity must be part of more extensive DRR measures and strategies and become complementary to the other essential risk management programs. Again, in applying Eco-DRR, it is essential to stress the combination of hardware and software measures, for instance, implementing eco-engineering solutions that utilize appropriate technical expertise, which is in turn supported by policies and integrated into development planning and decision-making processes. The success of this also heavily relies on the involvement of different actors (public and private sectors, civil society communities, academia, etc.) together with multiple sectors.

Within the study area, the local community has acted, at the same time, as inhabitants, users, and partners of the mangrove planting program. As activities of mangrove planting and ecosystem restoration take place within the pool of common resources, it is necessary to address some issues: (a) To whom is the ownership of mangroves granted? (b) Who will manage the mangrove ecosystem after the program ends—the government, local community, nongovernmental sector, or private sector?

According to the political ecology discourse, the vision of the community as the centerpiece of resource management/conservation tends to diverge from the dominant narrative that favors a dichotomy of state control on one end and the privatization of resources on the other for their management [26–28]. Such arguments ignore the critical interests and processes within the local community, especially for ownership, use, and management of the local space, in which mangrove degradation and restoration actually takes place, and tend to undermine the community mechanisms of participation in and advocacy for long-term goals of natural resource management. In order to answer the two questions mentioned above, this study investigated how space governance takes place in the mangrove project area and how it will shape future Eco-DRR in the face of recurring coastal hazards in Kepulauan Seribu as a representation of small islands in Indonesia.

This article was based on a qualitative study in the context of a small island coastal community in Indonesia that has ongoing experience in green infrastructure activities for disaster risk reduction—a project that promises both sustained development on the small islands and environmental restoration towards a resilient community. The article presents a case from a developing country where most critical barriers to mainstreaming disaster risk are institutional contestation on space management.

2. Methods

The information and data were mainly collected from the researcher's field surveys as well as governmental documents and statistics. The method of the field survey was designed following previous study practices on how to conduct a focus group and open-ended questionnaire in the setting of ecosystem and mangrove-related issues [29–31]. Before the interview session, the interviewer disclosed the study intentions. The interview activity also begins with obtaining approval for research and publication purpose from the interviewee. The discussion guide to the focus group was planned to have the moderator promoting dialogue of current community practices on ecosystem-based disaster risk reduction (Eco-DRR) and its pertinent ecosystem services to local beneficiaries [10,32–36].

This research was conducted mainly on mangrove planting in Pramuka's Kepulauan Seribu District based on interviews in a qualitative manner, including two strands of groups, location shown in Figure 1. In the fieldwork research, for the first strand, focus group discussions were included, aiming to gather information from local opinions from intentionally sampled groups of island residents, eventually composed of seven to nine individuals from the same community (random sampling frame in selecting participants for focus group discussion was called out in the last minute of the field work. It was due to social and cultural limitation. Thus, later in practice, an intentional sampling strategy was introduced, appealing to randomly selected sections of the island to recruit participants in the focus groups). In total, there were 14 participants (Table 1) with two rounds of discussion. Sixty-one percent of the participants were female and the overall age of the participants ranged from 18 to 42 years old. Their occupations varied from housewives, fisherman, to full-time employees. The majority of the participants fell into socioeconomic classification (SEC) C (skilled job). Most of the participants who were born in Kepulauan Seribu remained on the islands and described their strong association with the local area, spanning from remote and secluded islands to those that are currently major holiday destinations.

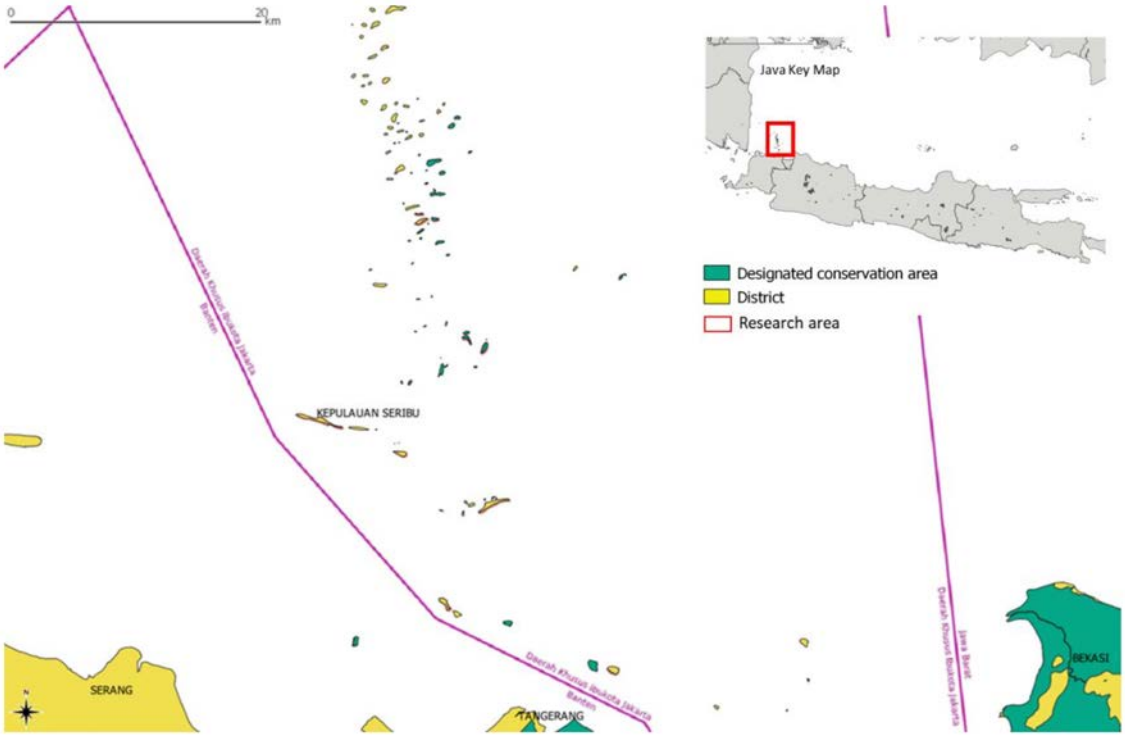

Figure 1. Map of Kepulauan Seribu Archipelago.

Table 1. List of FGD participant metadata.

FGD 1					
Code	**Age**	**Gender**	**Occupation**	**Been Stayed**	**SEC**
T1	34	F	Housewives	34	C
A1	26	F	Seeking a job (WG)	25	B
S4	29	F	Full Time	29	C
R3	34	F	Full Time	30	B
I1	33	F	Housewives (WG)	33	C
E3	32	F	Housewives	30	C
F3	21	M	Part time	20	E
H1	36	M	Fisherman	36	C
Z1	42	M	Full time	42	B
FGD 2					
Code	**Age**	**Gender**	**Occupation**	**Been Stayed**	**SEC**
S1	41	M	Full time (CL)	41	B
R2	37	M	Teacher (CL)	37	B
M1	36	M	Fish seller	36	C
S3	37	M	Fisherman	37	B
Y1	26	F	Housewives	26	C
F2	30	F	Housewives (WG)	30	C
A2	18	M	Student (YG)	17	E

CL = Community Leader; WG = Women Group; YG = Youth Group.

The discussion revolved around what the current situation of mangrove planting was in the area, who would manage the ecosystem when the program ended, how the community perceived this type of DRR approach, and so on (Table 2). Each of the focus groups lasted for roughly 1.5 h and was located in one of participant's house.

Table 2. Community discussion guide.

List of Questions
1. How do you think the area has changed compared to 10/20 years ago?
2. What do you feel of these changes? What is better? Moreover, what is more difficult?
3. How would you describe the current state of the island environment? Is it getting better or worse? Who/what is responsible?
4. If the change has been worse—how are residents adapting to these changes?
5. What about social and economic situations of your community? What are you/your community doing differently to before?
6. Who has supported you through these changes? Family, community, government? What kind of support do you get?
7. What do you think about the mangrove rehabilitation along the coastline?
8. Does the community participate in those projects? In what way?
9. How does (the project) benefit you and others? What went well, what could have been done better?
10. Who manages it on a daily basis? Are there any disputes occurring and how to solve the issues?

In the second component, for the policymakers at the national level, email-based open-ended questionnaire surveys were conducted to collect information from government officials, the private sector, and nongovernmental organization (NGOs). The list was drawn by purposeful sampling. This type of sampling is widely used in qualitative research as a method to identify resourceful interviewees related to the research interest [37]. An email-based questionnaire was chosen for several reasons. The online method is able to access hard-to-reach groups due to such constraints as time, travel, and budget associated with travel and data collection [38]. This method also offers a compression of time and space, so the information was gathered from stakeholders across Indonesia. However, the email-based open-ended questionnaire was initially expected to be returned in one week. However, most of the questionnaires took approximately more than three weeks to be returned to the researcher.

The objective of the study is to understand a variety of agencies' strategies regarding DRR, including the green-approach initiative, CCA, and more generally, coastal zone management (CZM), and to analyze what the opportunities and barriers are to the implementation of Eco-DRR. Then, the questions centered on the role of the responding agencies in DRR and the activities that they have/had undertaken related to Eco-DRR (Table 3).

Table 3. List of addressed agencies.

Government	Private Sector	NGOs/INGO	Thematic Organization
Ministry of Marine Affairs and Fisheries *,#	Toyota *,#	Terangi *,#	UNESCO #
National Board for Disaster Management *,#	Pertamina #	Sahabat Mangrove *,#	IPB *,#
Ministry of Environment and Forestry #	Pulau Seribu Resort #	Kiara *,#	Yapeka
BAPPEDA #	Adimas Multiwisata #	Red Cross#	Thamrin School of Climate Change & Sustainability
Ministry of Public Work #	CNOOC #	Wetland International #	
	Bank DKI #	Kemangteer #	

* = Responded, # = Working in the study area.

The researcher originally emailed questionnaires to 22 agencies, of which seven agencies responded: Indonesian National Board for Disaster Management (BNPB), The Ministry of Marine Affairs and Fisheries (MMAF), and The Ministry of Environment and Forestry (MoEF—Since 2014; formerly Ministry of Forestry/MoF), as well as NGOs, namely, Terangi, Red Cross and Sahabat Mangrove (Table 3). As shown in Table 4, the questionnaire provides the central points of the open-ended questionnaire with the national level agencies. All of the focus groups and email-based open-ended questionnaire answers were transcribed and coded using NVivo qualitative data analysis Software; QSR International Pty Ltd, Melbourne, Australia, Version 12 Plus,2018.

Table 4. Email-based questionnaire,

List of Questions to National Policy Makers and Private Sector	
1.	How familiar is the organization with the idea of ecosystem services? How do you see ecosystems in providing coastal protection services and of the use of ecosystems as a tool of DRR?
2.	If familiar with the concept of ecosystem services, do you consider the coastal protection services provided by ecosystems when (as applicable)?
√	Designing or implementing DRR management plans, projects, policies?
√	Designing or implementing coastal zone management plans, projects, policies?
3.	How does your organization work with the national, local, state, and municipal authorities and the private sector (please choose as necessary) on implementing the projects/programs?
4.	What is the post-project implementation like? How do you factor in the community as a part of the program?
5.	Please describe how your organization approaches the following situations when coordinating with other ministries or agencies.
√	Process to reconcile conflicting interests, if any.
√	Process to make different goals of multiple agencies meet the same target.

3. Results and Discussion

This section will demonstrate the results both from national and regional level interviews through email followed by the community focus group discussion.

3.1. National Policy and Regional Innitiative of Coastal Management in Indonesia

Poor people who live by coasts or rivers or on small islands are the most vulnerable group. It is necessary to strengthen our work together with the National Planning and Development

> Agency and the Ministry of Environment and Forestry—also with the private sector and think tanks (academia). —From an interview with a MMAF Officer

Before focusing on the results of exercising science-based policy in Kepulauan Seribu, this section will demonstrate the general trends of the national and regional policy of coastal management in Indonesia to identify the significance of the case within them. This section was based on policymaker email-based interviews and policy documents analysis.

In the past two to three decades, the government of Indonesia has introduced several policies at the national and district levels to introduce the practice of environmental and ecosystem conservation (Figure 2). The early regulation underlined conservation and protection of the critical environment. One of the pioneering legislations was law 5/1990. The law acts as an umbrella for the conservation of living resources and their ecosystems. It was then followed by a Presidential Decree (2) focusing on management of conservation areas from "post new order regime", law no. 32/2009 (3) on environmental protection, and law no. 41/2009 (4) on forestry. Later, the Ministry of Environment Regulation no. 9/2011 on Strategic Environmental Assessment (KLHS) (5) was introduced.

Figure 2. Early policy related to environment and ecosystem conservation.

To note, the initial initiative regarding mangrove forest management was announced by the Ministry of Fishery Affairs (former to MMAF) (1). It acknowledged the importance of maintaining a green belt/open space along the coast. The requirements for the belt were approximately 400 m width from the typical low-tide line. Later, the MoF delivered the Director-General for Forestry Decree (3) and Circular (3) that standardized the green belt to be within 200 m width along the coastline for mangrove forests. Those policies stated that the protection of coastlines aimed to prevent coastal areas from activities that can potentially harm mangroves and coastal vegetation functions for conservation. The decree sets standards at a minimum of 100 m from the spring tide on the land (Circular 507/IVBPHH/1990) (Figure 3).

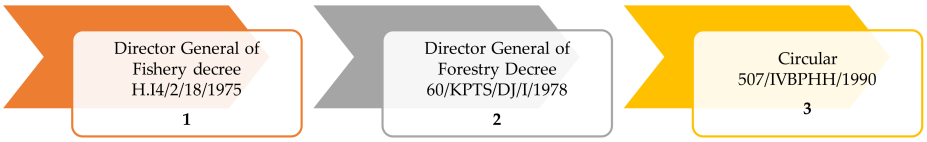

Figure 3. Policy related to mangrove forest management (initial policy).

To tackle continuous degradation of the coastal environment and related problems of disaster risk, around US$80 million was provided by the Indonesian Government for the anti-coastal-erosion works from 1996 to 2004, but it was only the case for Bali Island to protect valuable coastal tourism bases. Indeed, the approach used gray infrastructures (ex. breakwaters, jetties, or revetments) that would fuse functional design.

with aesthetic value, also combined with beach nourishment. It was successful to stop the coastal erosion on the beaches of Sanur, Nusa Dua, and Tanjung Benoa, but was neither cost-effective nor efficient. At low tide, land extended up to 300 m offshore and the areas exposed. Thus, it harmed the grey infrastructure. Therefore, the government had to increase the budget every five years to maintain it [39–41].

In the period after the 2004 Aceh Tsunami, the national government of Indonesia tried to establish a green belt on the west coast of Banda Aceh, aiming to mitigate future natural hazards

(the mangrove reforestation blueprint was substantially canceled, then finally the plan was itself abolished, though looking in part successful not in Banda Aceh but in some part of Aceh Besar/Aceh Besar [42]). The rehabilitation and reforestation of mangroves is part of the national policy movements related to forest and land rehabilitation. The activity was led by funding development from the International Tropical Timber Organization (ITTO) and Japan International Cooperation Agency (JICA). The post-tsunami activity was considered as a pioneering project that linked the mangrove's ecosystem services to the disaster risk reduction in inter-ministry collaboration such as Ministry of Forestry (MoF), Ministry of Home Affairs, Ministry of Marine Affairs and Fisheries, and many more. Furthermore, the activities have expanded to other places all over Indonesia, ranging from Sumatra to Papua. We can find that various activities were developed in community-based management and/or eco-tourism (Table 5).

Table 5. Mangrove rehabilitation project of the post-Aceh Tsunami.

No.	Location	Activity
1	Sembilang National Park, South Sumatra	• Integrating sustainable management and the use of the ecosystem as a conservation area, green belt, and eco-tourism activity.
2	North coast, Central Java Province	• A combination of silvo-fisheries and introduction of ecosystem services to reduce risk (erosion, sea level rise) • Maximizing sustainable silvo-fishery culture system to alleviate socioeconomic prosperity amongst the coastal community.
3	South coast, Bali Province	• Established mangrove information center • Promoting ecotourism related to the mangrove ecosystem
4	Teluk Bintuni, West Papua	• Re-introduced green belt to support silvicultural system of mangrove forests

At the ministerial level, 2014 was a milestone in managing marine resources and fisheries, and for this purpose, law 1/2014 was enacted. The newly introduced law supplemented long-term national development. MMAF is responsible for management of the coasts and small islands at the national level. At the same time, the institution is also a part of a larger DRR joint activity. This activity included DRR planning and coordination in inter-ministry strategic action. Law no. 1/2014 relates to the use of coastal areas and small islands in the context of conservation of their environment for the combined use of natural resources with fisheries, tourism, and DRR. Although significant regulations have been enacted, awareness of mangrove's ecosystem services was rather late.

3.2. An Attempt at Blending Space Management and Eco-DRR

In this section, the study will describe the present management of initiatives that are a blend of space management, disaster risk reduction, and science-based policy initiatives. The biophysical information derived from the scientific approach regarding coastal risk and the offer of green approaches as mitigation was turned into policy and the Ministry of Marine and Fisheries Affairs tailors the need to reduce the risk by including various sectors to manage the space.

The green approach has been defined in various ways by scholars. Mangrove planting as a part of reforestation is a way of connecting green spaces that conserves their value and function while at the same time benefiting human populations. The end goal is to sustain natural life and contribute to social and economic generation [43–48]. The green approach is characterized by certain binding rules, as follows: [49–51]

(1) Replanting/reforestation in a mass amount
(2) Enabling multi-functionality, such as providing benefits to people apart from conservation
(3) Being a substitute and/or supplementing DRR hard infrastructure [24].

It is nothing new for Kepulauan Seribu to have a pilot project related to coastal conservation. In 1990, Kepulauan Seribu formerly was a subdistrict of North Jakarta that was designated as one of the Marine Protected Areas (MPAs) under law no. 5/1990. As mentioned above, the goal is to maintain the resources of the ecosystem as a tool to protect areas that are situated on the edge of development due to depleted resources exacerbated by disaster risk. The MPA itself has ambitious goals. The program declared a 10 million hectares policy by the end of 1994 and further widened it to 30 million hectares ins 2000 [18,52].

The MPAs Act converted 75% of the district into a designated national park (Kepulauan Seribu Marine National /KSMNP). In 1999, KSMNP was placed under the control of the North Jakarta District and managed under the authority of a subdistrict level (Kecamatan). Under subdistrict administration, the park included two villages, Pulau Panggang and Pulau Kelapa, inside the KSMNP, and two other villages, Pulau Tidunga and Pulau Untung Jawa, outside the KSMNP border [22]. Initially, the local government of North Jakarta assigned Kepulauan Seribu three goals: (1) development of tourism industry, (2) growth of fishermen livelihoods, and (3) conservation of coral reef, mangroves, and the coast. Thus, six different land use types have been planned: (1) settlement, (2) tourist island, (3) re-greening island, (4) natural park, (5) cultural heritage, and (6) select designation.

By the time law no. 32/2004 (regional autonomy law) replaced law no. 22/1999, there were significant changes in marine and coastal management in Indonesia. This altered administration from a centralistic to a decentralist approach. Before, there was no significant part played by the district and subdistrict authorities, not to mention the local community linked to marine and coastal resources.

As a description of the present situation, the total number of inhabitants of Kepulauan Seribu is 23,321 people with 5830 households, with the population density reaching 2680 people/km^2 (BPS, 2016). Their main livelihood is fisheries. Due to their geographic location, farming is rarely an option. There are 3894 people working in the fisheries sector, 1179 people in services, and 1087 in the public sector (BPS, 2010). There are two types of fishermen in the area: the traditional type of fishermen ("nelayan tangkap") and the aquaculture fishermen. This typology of fisheries subsequently defines the social status of the fishermen. The fishermen engaged in fish culture that focuses on grouper (*Aethaloperca rogaa*) are seen as higher in social status, almost the same status as a fish middleman ("pelele"). In the second rank is the fishermen engaged in seagrass aquaculture. Then, in the third rank, is the traditional type of fishermen. The first two kinds of fishermen have to provide $1000 USD at minimum for starting the business, while the daily income of the last group would not exceed $10 USD per household. Owners of a homestay accommodations and grocery stores are also seen as persons of higher status on the islands. These business owners have close relations to the tourism industry on the islands.

Due to the progress of development, the mangroves in Kepulauan Seribu are threatened by significant consumption pressures on coastal land use conversion, unsustainable practices of fishing, and the inflow of waste water from human activities [19]. Changing land ownership on the islands is also seen as an important contributor to mangrove loss. Mangroves on privately-owned islands have been poorly managed because the owner is often a nonresident. In general, three types of land ownership can be seen. In total, 60 islands are privately owned, 11 islands are used for residential areas, and 39 islands belong to the local government. Some of the privately owned islands manage to keep the mangrove intact [1], while the residential-use and government-owned islands are unable to avoid rapid land conversion that diminishes the mangrove coverage. Since the early 1980s, land ownership has been changed through buying and selling from/to outsiders. The residents frequently sell their own land mainly to fund their pilgrimage/hajj or to buy new fishing tool supplies.

According to the feedback from the questionnaires with MMAF officers, the Indonesian Government initiated the management of mangroves in Kepulauan Seribu in 1998 through mangrove-tree planting. However, this first initiative was far from successful. The reason behind the failure was the conventional planting method applied. High wind and storms swept planted seedlings in significant numbers.

In the beginning of 2002, a new planting method was introduced. It was named high-density planting. The intention is to build natural nurseries of mangroves, resulting in encouragingly and properly grown mangrove seedlings. This method is to plant close clumps of mangrove seedlings, one clump consisting of 550 seedlings, with dense spacing of 50 seedlings long and 11 seedlings wide (Figure 4). Although at that time this method was considered new and out-of-mainstream planting, the method was a success. Thus, in 2004, MoF aspired to involve a wider segment of the local community as a part of the activity.

Figure 4. Plot of participatory mangrove planting in Indonesia.

In 2005–2007, the initiative was adopted as a planting program of MoF. The national program contributed to forest and land rehabilitation (GERHAN/G-RHL), targeting Kepulauan Seribu. Planting mangroves was conducted in two stages. Each of the stages was a community-based activity, which took three months for each stage to be accomplished:

(a) First stage (planting): surveys on site, development of nursery, selecting seedlings, planting and establishing a secure environment for the seedlings (installing protection from bamboo). In this stage, community participation involved housewives putting sand as a seedling medium in a plastic bag which was then a part of the nursery stage.
(b) Second stage: maintenance and repairing. The community member role was to replace dead seedlings to uphold the minimum number of seedlings in each clump. The activity continued up to the roots to ensure they had firm gripping.

In ecosystem services related to tsunami risk reduction literature, it has been shown that mangroves can perform the function of filtering suspended material and assimilating and dissolving nutrients properly after one year of growing. In practice, it takes at minimum 10 years to grow mangroves reaching a 500 m wide area of reforestation that will able to reduce a tsunami's hydrodynamic impact [53–55].

Mangrove planting and rehabilitation through the nationwide program of "Ayo Tanam Mangrove" (Let's Plant Mangrove) by the Ministry of Fisheries and Marine Affairs is in line with the Head of District Program that aims at maximizing ecosystem services to alleviate poverty by the tourism industry. The district government of Kepulauan Seribu provides two types of tourist activities on weekends and weekdays: marine-based tourism and educational tourism, respectively. For marine-based tourism, the activities include a visit to the area offshore from white sandy beaches

to mangroves, and in educational tourism days, activities such as bird conservation and planting mangroves is part of the attraction, both interrelated closely to each other around mangroves. Therefore, maintaining mangroves properly is significant not only for environmental conservation but also tourism.

The local government works together with the private sector through the CSR and tour agents. For example, Pertamina (government oil company) and Toyota are targeting to plant 1.6 million trees by the end of 2018. The location was North Java coast and East Kalimantan. The current project has already reached 1 million trees. This project was handed to NGOs and local community-based organizations to provide the seedlings. There is also a partnership with local tourist agencies and tourist boat operators enlisted as middlemen in mangrove planting. The tour agent charges an additional $1–2 USD for the tour cost. The funds from the CSR and tour operators help the community-based organizations maintain the mangrove nurseries that pay as their side income.

In the field, the mangrove planting program is expecting community contribution towards spatial inventories. This comprises human and economic assets, natural entities, and social scape [56]. It aims to distribute the power and skills in identifying respective institutions while at the same time building a respective platform as a negotiation arena amongst stakeholders. The MMAF centrally supervises all mangrove records along with the local government, which is then followed by the development of transparent and accessible inventories [57]. Collaborative activity accomplished between mangrove management stakeholders with local communities has created an intercession situation that is supported by the district government and its regulations.

3.3. Challenges on the Ground

A mangrove afforestation project aimed to rehabilitate the shoreline was started in 2007 based on law no. 27/2007, before law no. 1/2014 on Coastal and Small Island Management was enacted. The community-based coastal afforestation on the north coast of Java (Semarang, Tegal) and Bali received funding from numerous agencies (JICA, UNDP, NORAD, and The Netherlands). It was regarded as a project with a multitude of stakeholders, including the national government, local government, NGO, international agencies, private sector, and community members. Since the beginning, the project's emphasis was on community participation as its core activity. Engaging the community to be part of the program was seen as a feasible alternative to centralized and bureaucratic governance systems [58–62]. Since then, the project has used crowdfunding to expand its funding scope to reduce vulnerability on the north coast of Java.

The government of Kepulauan Seribu aims to raise peoples' awareness of lost mangroves that have been experienced in Kepulauan Seribu through involving the local community and the tourists using the platform from MMAF. The plantation, however, seems far from successful. Even after the planting method was changed, approximately 40% of planted seeds were washed away by waves due to poor management in the post-planting phase, in which the community was rarely engaged [63]. The authorities tend to claim that residents participate in the planting process as a community-based mangrove management (CBMM) system and then claim success of the activity based on the fact that the program has a community-involvement element.

The basis of CBMM is to be combined into a wider concept of community-based natural resource management known as CBNRM. It is a concept that refers to rights, authorities, and responsibilities from a decentralization perspective down to the local community as a partner in natural resource management [64,65]. In practice, CBBM tries to advocate for the capacities of the local community's participation in completing the dynamic activities beyond resource identification. Further participation is expected to drive the community in planning and implementing priorities and the utilization of fitting technologies [66,67]. However, what has been found in the case of Kepulauan Seribu is that the two concepts become rather distinctive from the general effort of CBNRM. The distinction lies in the uniqueness of mangroves as an ecosystem in the context of nature–society relations, so that it is necessary to continue looking after them not only in planting but also longer-term managing processes.

In the geographical socioeconomic context of local–regional relations, the islands are under pressure from metropolitan tourist development on the one hand and in focal places of coastal environmental conservation on the other.

The CBMM actors in Kepulauan Seribu can be distinguished into three groups: the central and local governments, private companies, and NGOs or the community. In Kepulauan Seribu, based on the national goals for long-term recovery of the coastal area, the local government made the priority policy of replanting mangroves, and the local government implemented the concrete program encouraging the community to engage in such activities to restore the coastal ecosystem by community initiative reforestation and to include public participation in restoring mangrove and coastal ecosystems.

However, this public participation is only in planting, and particularly for outside tourists, it could be just in paying for some part of the cost. Thus, the concept of CBMM is applied to a countless number of program, with the purpose of community involvement becoming to gather more and more citizens for planting mangroves and not in managing their planting efforts.

Focusing on the interviews with the residents themselves in Kepulauan Seribu, the CBMM is likely to be misunderstood and sometimes associated with a sense of community involvement. Furthermore, most of the residents get little direct benefit and tend to feel alienated from the mangrove planting initiative. In this area, both the private companies and the community people can freely participate in mangrove plantation, and this means that both parties with different motivations are placed under competition for utilization. The concept of the CBMM has become blurred, especially concerning its significance for the local community. The community has so far derived no direct-use value out of the mangroves for itself. At least from the interviews, the local people do not think that conservation of mangroves could lead to reproduction of the pool of their common resources so that their livelihoods would be dependent on it. As a matter of fact, only owners of the homestay accommodations and tourist boats get the most benefit because of many tourist visits to the islands.

This problem is also related to how the program is managed. In many parts of the Indonesia, engagement of the coastal community is limited to mostly one stage of the project cycle. Such advanced stages, for example, allocation and project evaluation of their own territory, has rarely seen community involvement. The discussion with the group revealed, in the study location, the most common practice for the community people is to not participate in every stage, to not have a say in the decision-making process of the program, but just in the first planting stage at the implementation level.

Meanwhile, for example in Untung Jawa, the planting contributors recognize the sense of rehabilitation and the rehabilitation program. Study participants thought how their involvement was only as an object rather than an actor of the project. Further, the constant and repetitive public consultation and community meetings may result in fatigue, as the community are increasingly asked to join in participatory processes that are likely less sustain. There is an increasing sense in the community that their involvement does not afford them the capacity to affect decisions that touch their daily lives [68–70]. In these circumstances, the participatory processes are regarded as 'talking shops', creating uncertainty and postponement in decisive action. With current economic circumstances, the community is focused more on how to gain earnings based on seeds nurseries for which they responsible and having additional income by working as a planter to the program. It is hardly heard that they are concerned about the future reforested mangroves.

To some extent, the local government is unsure of DRR activity involving ecosystem services. The local government's limited information often draws back their initiative. The unique local biogeographic conditions are frequently neglected by the ministry. Decision makers are interested in knowing the potential value of mangroves in reducing the size of a levee required to provide protection during typical, moderate-strength storms.

3.4. Development Foci in Ecosystem-Based Disaster Risk

There is sometimes uncertainty in the mandates when it comes to Eco-DRR activities. The fact that some activities are not undertaken by specific agencies because of geographical or thematic

"boundaries" and conflicting mandates between laws from the central government can be a limitation with respect to implementing Eco-DRR projects which require landscape approaches and are interdisciplinary in nature. The current work flows are directed by the MMAF. They also act as an inter-agency coordinator both in task distribution and financial flow. Academia provides the expertise to formulate a science-based policy together with NGOs and bilateral donors. Some of the activities are not specific to coastal areas but can cover coastal areas among other landscapes (Figure 5).

From Figure 5, it is also clear that there are overlaps in activities, notably regarding vulnerability and risk assessments, which could provide an opportunity to generate some synergies instead of duplication. This could also ultimately inform potential Eco-DRR activities when the variables of ecosystems and the services are factored in. Many agencies also work on green belts and maximizing ecosystem service projects. This could be an opportunity to build synergies to achieve restoration, conservation, and Eco-DRR goals at wider scales.

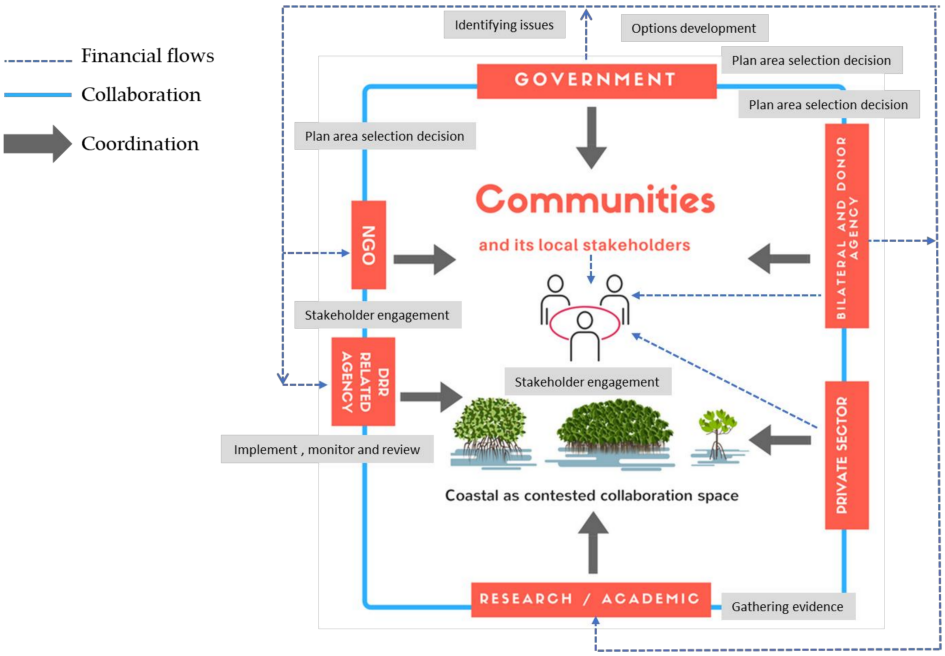

Figure 5. Key institutional linkages facilitating the activities of the Eco-DRR in Indonesia (national level). Arrows show coordination and dashed arrow shows financial flows; thicker lines indicate stronger interactions.

Again, in a larger view, mangroves are grouped into a distinct environment. They inhabit the area between dry land and shallow brackish water. Their distinctive character already introduces complications to planning and management, both in ecosystem management and gaining ecosystem services to serve DRR [5]. The complication lies in competing claims and overlapping interests in the land, mangroves, and their products [40,71]. Their significant value creates tension and competition among forest users and land developers.

Both sides feel that they are entitled to rights and entitled to claim and control access, within a single institution apparatus or even further a privatization approach. Also, the tenure dynamic of the mangrove ecosystem is somewhat delicate. As an example, passage for fishing boats is usually treated as a common pool resource where mangrove harvesting is usually available for local fishers [72–74]. The difficulties in managing this ecosystem is reflected in government policy. Mangroves are seen as relatively worthless [75–77]. Thus, policy and action plans in most cases have been late in coming, yet its sustainability to strengthen DRR and supporting development of coastal community is likely to be abandoned.

4. Conclusions

The idea of making use of ecosystems for disaster risk reduction (Eco-DRR) is rapidly growing. The management of mangrove planting along the coastline as a space of contestation was undeniably difficult to avoid. In the study area, it is argued that the restored mangrove forest management and newly planted area currently have a limited mandate under the MMAF and cannot function beyond the designated program boundaries. Yet, future initiatives should be scrutinized to ensure they are promoting the actual community needs rather than community acceptance. Promoting actual community needs and considering heterogeneous characteristic of the in situ community may empower and at the same time significantly increase community resilience to coastal hazards [78].

In the political and policy realm, especially at the implementation level, there is ambiguity among residents and private companies in the case of Kepulauan Seribu. It is most likely influenced by a lack of knowledge, different levels of local awareness, as well as such internal factors as motivation, locus of control, responsibilities, and priorities. The community is increasingly highlighted as a key actor, with activities rarely followed up after the program finishes.

In the past 10 years, the Eco-DRR approach in coastal risk has involved approaches for reducing the vulnerability of communities and ecosystems. Of the mangrove afforestation as part of Eco-DRR in Indonesia, some have developed into healthy initiatives and at the same time serve social-economic benefits to community. Some programs have been able to develop a strong collaborative approach in multilevel and multiscale governance institutions as piloted by notable districts. Unfortunately, there were some failed initiatives that took place, as the community failed to foster mangrove co-management and authorities likely failed in building trust and program sustainability.

Alternative actors should play a more significant role and be able to improve their capacity to work as partners with the ministry to attain the mandates. Considering such complex landscapes of coastal settings, it is highly probable that stand-alone legislation will likely fail to address the problems. Thus, better management must play a supporting role to carry that burden.

It seems to be a successful strategy to replant mangroves based on the national program combined with the tourist industry involving the community, but nevertheless, this mechanism itself brings some tokenism and growing competitions over the space, and eventually failure in long-term mangrove management, overarching not only planting but also rehabilitation, leading to the incapacity of the local community in socioeconomic terms. Therefore, the local social coordination between the government, private and third sectors, and the community—ensuring inter-confidence among them—is necessary to improve Eco-DRR initiatives concerning local environments.

In the larger scale, the governance system likely needs to shift its environmental conservation from the centralist state to a decentralized manner, delegating the power to the civil society at the local level. Some scholars have commented on how DRR, conservation, and development are likely to be coupled, as the three activities have a common aim and all focus on attaining goals through market mechanisms [79–82]. Market mechanism has a unique approach to addressing socio-economic and environmental issues at the same time [83]. Mangrove forest in the coastal area owns public goods dimension since they produce externalities as a result of exploitation. Its management is subject to competing claims ranging from the local community that depend on the ecosystem existence for their livelihood, the environment, and the private sector. The current mangrove planting activity as a part of DRR add additional externalities into it. Community reliance on the mangrove forest and its value to protect the coastal community from exacerbated climatic event needs to addressed at the same time. Market mechanism instrument that complements DRR regulations may offer an economically efficient push to socio-environmental protection, encourage sustainable growth, and protect resources. For example, community-based payment model may also help limit community discrimination and promote more comprehensive engagement with outside actors. Therefore, it is an urgent need to factor economic incentives to the Eco-DRR activity delicately. It is to avoid a failure that will have a detrimental effect on social concerns such as poverty alleviation in the long run.

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References

1. Direktorat Pendayagunaan Pulau-Pulau Kecil. *Success Story Rehabilitasi Mangrove Dan Vegetasi Pantai*; Kementerian Kelautan dan Perikanan: Jakarta, Indonesia, 2013.
2. Carlos, J.; Bayas, L.; Marohn, C.; Dercon, G.; Dewi, S.; Peter, H.; Joshi, L. Influence of Coastal Vegetation on the 2004 Tsunami Wave Impact in West Aceh. *Proc. Natl. Acad. Sci. USA* **2011**, *108*, 18612–18617.
3. Hidayati, D. Striving to Reduce Disaster Risk: Vulnerable Communities with Low Levels of Preparedness in Indonesia. *J. Disaster Res.* **2012**, *7*, 75–82. [CrossRef]
4. Kathiresan, K.; Bingham, B.L. Biology of Mangroves and Mangroves Ecosystems. *Adv. Mar. Biol.* **2001**, *40*, 81–251.
5. Walters, B.B.; Rönnbäck, P.; Kovacs, J.M.; Crona, B.; Hussain, S.A.; Badola, R.; Primavera, J.H.; Barbier, E.; Dahdouh-Guebas, F. Ethnobiology, Socio-Economics and Management of Mangrove Forests: A Review. *Aquat. Bot.* **2008**, *89*, 220–236. [CrossRef]
6. Costanza, R.; D'Arge, R.; de Groot, R.; Farber, S.; Grasso, M.; Hannon, B.; Limburg, K.; Naeem, S.; O'Neill, R.V.; Paruelo, J.; et al. The Value of the World's Ecosystem Services and Natural Capital. *Nature* **1998**, *387*, 253–260. [CrossRef]
7. Abdullah, K.; Said, A.M.; Omar, D. Community-Based Conservation in Managing Mangrove Rehabilitation in Perak and Selangor. *Procedia Soc. Behav. Sci.* **2014**, *153*, 121–131. [CrossRef]
8. Polidoro, B.A.; Carpenter, K.E.; Collins, L.; Duke, N.C.; Ellison, A.M.; Ellison, J.C.; Farnsworth, E.J.; Fernando, E.S.; Kathiresan, K.; Koedam, N.E.; et al. The Loss of Species: Mangrove Extinction Risk and Geographic Areas of Global Concern. *PLoS ONE* **2010**, *5*, e10095. [CrossRef] [PubMed]
9. Richards, D.R.; Friess, D.A. Rates and Drivers of Mangrove Deforestation in Southeast Asia, 2000–2012. *Proc. Natl. Acad. Sci. USA* **2016**, *113*, 344–349. [CrossRef] [PubMed]
10. Giri, C.; Ochieng, E.; Tieszen, L.L.; Zhu, Z.; Singh, A.; Loveland, T.; Masek, J.; Duke, N. Status and Distribution of Mangrove Forests of the World Using Earth Observation Satellite Data. *Glob. Ecol. Biogeogr.* **2011**, *20*, 154–159. [CrossRef]
11. Marois, D.E.; Mitsch, W.J. Coastal Protection from Tsunamis and Cyclones Provided by Mangrove Wetlands—A Review. *Int. J. Biodivers. Sci. Ecosyst. Serv. Manag.* **2015**, *11*, 71–83. [CrossRef]
12. Dalimunthe, S.A.; Putri, I.A. Mangrove Rehabilitation in Seribu Islands at the Crossroad of Awareness and Tokenism. In *Participatory Mangrove Management in a Changing Climate Perspectives from the Asia-Pacific*; DasGupta, R., Shaw, R., Eds.; Springer: Osaka, Japan, 2017; pp. 229–245.
13. Castree, N. Commodifying What Nature? *Prog. Hum. Geogr.* **2003**, *27*, 273–297. [CrossRef]
14. Schipper, E.L.F.; Thomalla, F.; Vulturius, G.; Davis, M.; Johnson, K. Linking Disaster Risk Reduction, Climate Change and Development. *Int. J. Disaster Resil. Built Environ.* **2016**, *7*, 216–228. [CrossRef]
15. Wilcox, D. *Community Participation and Empowerment: Putting Theory Into Practice*; IIED: New York, NY, USA, 1994.
16. Wilhelm, M. *The Role of Community Resilience in Adaptation to Climate Change: The Urban Poor in Jakarta, Indonesia*; Springer: Berlin, Germany, 2011.
17. Dalimunthe, S.A.; Putri, I.A. Ceram: An Investigation of Response to the Changing Climate in Greater Jakarta. *Sosioteknologi ITB* **2016**, *15*, 298–308. [CrossRef]
18. Fauzi, A.; Buchary, E.A. A Socioeconomic Perspective of Environmental Degradation at Kepulauan Seribu Marine National Park, Indonesia. *Coast. Manag.* **2002**, *30*, 167–181. [CrossRef]
19. Farhan, A.R.; Lim, S. Vulnerability Assessment of Ecological Conditions in Seribu Islands, Indonesia. *Ocean Coast. Manag.* **2012**, *65*, 1–14. [CrossRef]

20. Faizal, I. Kondisi Dan Distribusi Terumbu Karang Pada Zonasi Taman Nasional Kepulauan Seribu, Provinsi DKI Jakarta, Universitas Padjajaran, 2012. Available online: http://fpik.unpad.ac.id/kondisi-dan-distribusi-terumbu-karang-pada-zonasi-taman-nasional-kepulauan-seribu-provinsi-dki-jakarta/ (accessed on 2 April 2016).
21. Rees, J.G.; Setiapermana, D.; Sharp, V.A.; Weeks, J.M.; Williams, T.M. Evaluation of the Impacts of Land-Based Contaminants on the Benthic Faunas of Jakarta Bay, Indonesia. *Oceanol. Acta* **1999**, *22*, 627–640. [CrossRef]
22. Arifin, Z. *Local Millenium Ecosystem Assessment: Condition and Trend of the Greater Jakarta Bay Ecosystem*; Report Submitted to Assistant Deputy for Coastal and Marine Ecosystem; The Ministry of Environment: Jakarta, Indonesia, 2004; p. 33.
23. Renaud, F.; Rieu-Sudmeier, K.; Estrella, M.; Nehren, U. *Ecosystem-Based Disaster Risk Reduction and Adaptation in Practice*; Springer International Publishing: Cham, Switzerland, 2016.
24. Renaud, F.G.; Sudmeier-Rieux, K.; Estrella, M. (Eds.) *The Role of Ecosystem in Disaster Risk Reduction*; UNU Press: Tokyo, Japan, 2013.
25. Ministry of the Environment. *Ecosystem-Based Disaster Risk Reduction: Handbook for Practitioners*; Wakui, S., Ed.; Biodiversity Global Strategy Planning Unit, Natural Environment Planning Section, Natural Conservation Bureau, Ministry of the Environment: Tokyo, Japan, 2016.
26. Li, T.M. Images of Community: Discourse and Strategy in Property Relations. *Dev. Chang.* **1996**, *27*, 501–527. [CrossRef]
27. Larson, A.; Ribot, J. Democratic Decentralisation through a Natural Resource Lens: An Introduction. *Eur. J. Dev. Res.* **2004**, *16*, 1–25. [CrossRef]
28. Gustavsson, E.; Elander, I.; Lundmark, M. Multilevel Governance, Networking Cities, and the Geography of Climate-Change Mitigation: Two Swedish Examples. *Environ. Plan. C Gov. Policy* **2009**, *27*, 59–74. [CrossRef]
29. Washburn, E.L. A Social Landscape Analysis of Land Use Decision Making in a Coastal Watershed. *Soc. Nat. Resour.* **2012**, *26*, 325–338. [CrossRef]
30. Van Wesenbeeck, B.K.; Balke, T.; van Eijk, P.; Tonneijck, F.; Siry, H.Y.; Rudianto, M.E.; Winterwerp, J.C. Aquaculture Induced Erosion of Tropical Coastlines Throws Coastal Communities Back into Poverty. *Ocean Coast. Manag.* **2015**, *116*, 466–469. [CrossRef]
31. Sutton-grier, A.E.; Wowk, K.; Bamford, H. Future of Our Coasts: The Potential for Natural and Hybrid Infrastructure to Enhance the Resilience of Our Coastal Communities, Economies and Ecosystems. *Environ. Sci. Policy* **2015**, *51*, 137–148. [CrossRef]
32. Pernetta, J.C.; Ong, J.E.; Padilla, N.E.O.; Rahim, K.A.; Chinh, N.T. Determining Regionally Applicable Economic Values for Coastal Habitats and Their Use in Evaluating the Cost Effectiveness of Regional Conservation Actions: The Example of Mangroves, in the South China Sea. *Ocean Coast. Manag.* **2013**, *85*, 177–185. [CrossRef]
33. Murdiyarso, D.; Purbopuspito, J.; Kauffman, J.B.; Warren, M.W.; Sasmito, S.D.; Donato, D.C.; Manuri, S.; Krisnawati, H.; Taberima, S.; Kurnianto, S. The Potential of Indonesian Mangrove Forests for Global Climate Change Mitigation. *Nat. Clim. Chang.* **2015**, *5*, 1089–1092. [CrossRef]
34. Barbier, E.B. A Global Strategy for Protecting Vulnerable Coastal Populations. *Science* **2014**, *345*, 1250–1251. [CrossRef] [PubMed]
35. Gedan, K.B.; Kirwan, M.L.; Wolanski, E.; Barbier, E.B.; Silliman, B.R. The Present and Future Role of Coastal Wetland Vegetation in Protecting Shorelines: Answering Recent Challenges to the Paradigm. *Clim. Chang.* **2011**, *106*, 7–29. [CrossRef]
36. Zhang, K.; Liu, H.; Li, Y.; Xu, H.; Shen, J.; Rhome, J.; Smith, T.J. Estuarine, Coastal and Shelf Science The Role of Mangroves in Attenuating Storm Surges. *Estuar. Coast. Shelf Sci.* **2012**, *102–103*, 11–23. [CrossRef]
37. Palinkas, L.A.; Horwitz, S.M.; Green, C.A.; Wisdom, J.P.; Duan, N.; Hoagwood, K. Purposeful Sampling for Qualitative Data Collection and Analysis in Mixed Method Implementation Research. *Adm. Policy Ment. Health Ment. Health Serv. Res.* **2015**, *42*, 533–544. [CrossRef] [PubMed]
38. British, S.; Dec, N. The Use of Email Interviewing as a Qualitative Method of Inquiry in Educational Research Author. (s): Nalita James Published by: Wiley on Behalf of BERA Stable. Available online: http://www.Jstor.Org/Stable/30032802 (accessed on 2 April 2016).
39. Lubis, A.M.; Sato, T.; Tomiyama, N.; Isezaki, N.; Yamanokuchi, T. Ground Subsidence in Semarang-Indonesia Investigated by ALOS-PALSAR Satellite SAR Interferometry. *J. Asian Earth Sci.* **2011**, *40*, 1079–1088. [CrossRef]

40. Riyanti, D.; Matthias, G.; Frank, T.; Rajib, S. *Disaster Risk Reduction in Indonesia*; Springer International Publishing: Cham, Switzerland, 2017.
41. Siagian, T.H.; Purhadi, P.; Suhartono, S.; Ritonga, H. Social Vulnerability to Natural Hazards in Indonesia: Driving Factors and Policy Implications. *Nat. Hazards* **2014**, *70*, 1603–1617. [CrossRef]
42. Mardiatno, D.; Takahashi, M. *Community Approach to Disaster*; Gadjah Mada University Press: Yogyakarta, Indonesia, 2012.
43. Benedict, M.A.; McMahon, E.T. Green Infrastructure: Smart Conservation for the 21st Century. *Renew. Res. J.* **2002**, *20*, 12–17.
44. Fairhead, J.; Leach, M.; Scoones, I. Green Grabbing: A New Appropriation of Nature? *J. Peasant Stud.* **2012**, *39*, 237–261. [CrossRef]
45. Green, K.E.; Adams, W.M. Green Grabbing and the Dynamics of Local-Level Engagement with Neoliberalization in Tanzania's Wildlife Management Areas. *J. Peasant Stud.* **2015**, *42*, 97–117. [CrossRef]
46. Cowles, E.R. Using the Social-Ecological Systems Framework to Evaluate Green Infrastructure: Coastal Management Case Studies from Vietnam and Bangladesh. The University of Minnesota, 2015. Available online: http://hdl.handle.net/11299/172525 (accessed on 2 April 2016).
47. Sutton-Grier, A.E.; Gittman, R.K.; Arkema, K.K.; Bennett, R.O.; Benoit, J.; Blitch, S.; Burks-Copes, K.A.; Colden, A.; Dausman, A.; DeAngelis, B.M.; et al. Investing in Natural and Nature-Based Infrastructure: Building Better along Our Coasts. *Sustainability* **2018**, *10*, 523. [CrossRef]
48. Smith, C.S.; Gittman, R.K.; Neylan, I.P.; Scyphers, S.B.; Morton, J.P.; Joel Fodrie, F.; Grabowski, J.H.; Peterson, C.H. Hurricane Damage along Natural and Hardened Estuarine Shorelines: Using Homeowner Experiences to Promote Nature-Based Coastal Protection. *Mar. Policy* **2017**, *81*, 350–358. [CrossRef]
49. Naumann, S.; Rayment, M.; Nolan, P.; Forest, T.M.; Gill, S.; Infrastructure, G.; Forest, M. *Design, Implementation and Cost Elements of Green Infrastructure Projects*; Final Report; European Commission: Brussels, Belgium, 2011; No. 070307; p. 142.
50. Alves, A.; Gómez, J.P.; Vojinovic, Z.; Sánchez, A.; Weesakul, S. Combining Co-Benefits and Stakeholders Perceptions into Green Infrastructure Selection for Flood Risk Reduction. *Environments* **2018**, *5*, 29. [CrossRef]
51. Ruckelshaus, M.H.; Guannel, G.; Arkema, K.; Verutes, G.; Griffin, R.; Guerry, A.; Silver, J.; Faries, J.; Brenner, J.; Rosenthal, A. Evaluating the Benefits of Green Infrastructure for Coastal Areas: Location, Location, Location. *Coast. Manag.* **2016**, *44*, 504–516. [CrossRef]
52. Thomascik, T.; Mah, A.J.; Nontji, A.; Moosa, M.K. *The Ecology of the Indonesian Seas: Part Two*; Periplus Editions: Singapore, 1997; Volume 8.
53. Brown, B.E. Damage and Recovery of Coral Reefs Affected by El Niño Related Sea Water Warming in the Thousand Island, Indonesia. *Coral Reefs* **1990**, *8*, 163–170. [CrossRef]
54. Feagin, R.A.; Mukherjee, N.; Shanker, K.; Baird, A.H.; Cinner, J.; Kerr, A.M.; Koedam, N.; Sridhar, A.; Arthur, R.; Jayatissa, L.P.; et al. Shelter from the Storm? Use and Misuse of Coastal Vegetation Bioshields for Managing Natural Disasters. *Conserv. Lett.* **2010**, *3*, 1–11. [CrossRef]
55. Yanagisawa, H.; Koshimura, S.; Miyag, T.; Imamura, F. Tsunami Damage Reduction Performance of a Mangrove Forest in Banda Aceh, Indonesia Inferred from Field Data and a Numerical Model. *J. Geophys. Res. Ocean.* **2010**, *115*, 1–11. [CrossRef]
56. Riggs, R.A.; Langston, J.D.; Margules, C.; Boedhihartono, A.K.; Lim, H.S.; Sari, D.A.; Sururi, Y.; Sayer, J. Governance Challenges in an Eastern Indonesian Forest Landscape. *Sustainability* **2018**, *10*, 169. [CrossRef]
57. Siry, H.Y. Decentralized Coastal Zone Management in Malaysia and Indonesia: A Comparative Perspective. *Coast. Manag.* **2006**, *34*, 267–285. [CrossRef]
58. Berkes, F. Devolution of Environment and Resources Governance: Trends and Future. *Environ. Conserv.* **2010**, *37*, 489–500. [CrossRef]
59. Stevenson, T.C.; Tissot, B.N. Current Trends in the Analysis of Co-Management Arrangements in Coral Reef Ecosystems: A Social-Ecological Systems Perspective. *Curr. Opin. Environ. Sustain.* **2014**, *7*, 134–139. [CrossRef]
60. Pomeroy, R.S.; Ratner, B.D.; Hall, S.J.; Pimoljinda, J.; Vivekanandan, V. Coping with Disaster: Rehabilitating Coastal Livelihoods and Communities. *Mar. Policy* **2006**, *30*, 786–793. [CrossRef]
61. Sudara, S. Who and What Is to Be Involved in Successful Coastal Zone Management: A Thailand Example. *Ocean Coast. Manag.* **1999**, *42*, 39–47. [CrossRef]

62. Ensor, J.E.; Park, S.E.; Attwood, S.J.; Kaminski, A.M.; Johnson, J.E. Can Community-Based Adaptation Increase Resilience? *Clim. Dev.* **2018**, *10*, 134–151. [CrossRef]
63. Priyono, A. *Panduan Praktis Teknik Rehabilitasi Mangrove Di Kawasan Pesisir Indonesia*; KeSEMAt: Semarang, Indonesia, 2010.
64. Brehm, J.M.; Eisenhauer, B.W.; Krannich, R.S. Community Attachments as Predictors of Local Environmental Concern: The Case for Multiple Dimensions of Attachment. *Am. Behav. Sci.* **2012**, *50*, 142–165. [CrossRef]
65. Masterson, J.H.; Peacock, W.G.; Van Zandt, S.S.; Grover, H.; Schwarz, L.F.; Cooper, J.T. *Planning for Community Resilience: A Handbook for Reducing Vulnerability to Disasters*; Island Press: Washington, DC, USA, 2014; p. 255.
66. Datta, D.; Chattopadhyay, R.N.; Guha, P. Community Based Mangrove Management: A Review on Status and Sustainability. *J. Environ. Manag.* **2012**, *107*, 84–95. [CrossRef] [PubMed]
67. Shivakoti, G.; Pradhan, U.; Helmi, H. (Eds.) *Redefining Diversity and Dynamics of Natural Resources Management in Asia*; Elsevier B.V.: Jakarta, Indonesia, 2017; Volume 4.
68. Burton, P. Conceptual, Theoretical and Practical Issues in Measuring the Benefits of Public Participation. *Evaluation* **2009**, *15*, 263–284. [CrossRef]
69. Reed, M.S. Stakeholder Participation for Environmental Management: A Literature Review. *Biol. Conserv.* **2008**, *141*, 2417–2431. [CrossRef]
70. Evely, A.C.; Pinard, M.; Reed, M.S.; Fazey, I. High Levels of Participation in Conservation Projects Enhance Learning. *Conserv. Lett.* **2011**, *4*, 116–126. [CrossRef]
71. Walters, B.B.; Walters, B.B. Local Management of Mangrove Forests in the Philippines: Successful Conservation or Ef Cient Resource Exploitation? *North* **2004**, *32*, 177–195. [CrossRef]
72. Gibbs, M.T. Why Is Coastal Retreat so Hard to Implement? Understanding the Political Risk of Coastal Adaptation Pathways. *Ocean Coast. Manag.* **2016**, *130*, 107–114. [CrossRef]
73. Borrini-Feyerabend, G.; Rosemary, H. Governance for the Conservation of Nature. In *Protected Area Governance and Management*; Worboys, G., Lockwood, M., Kothari, A., Pulsford, I., Eds.; ANU Press: Canberra, Australia, 2015; pp. 169–206.
74. McNamara, K.E.; Buggy, L. Community-Based Climate Change Adaptation: A Review of Academic Literature. *Local Environ.* **2017**, *22*, 443–460. [CrossRef]
75. Mitsch, W.J. *Wetland Creation, Restoration, and Conservation: The State of Science*; Elsevier: Newnes, Australia, 2005.
76. Walters, B. Mangrove Forests and Human Security. *CAB Rev. Perspect. Agric. Vet. Sci. Nutr. Nat. Resour.* **2008**, *3*, 1–9. [CrossRef]
77. Carter, H.N.; Schmidt, S.W.; Hirons, A.C. An International Assessment of Mangrove Management: Incorporation in Integrated Coastal Zone Management. *Diversity* **2015**, *7*, 74–104. [CrossRef]
78. Mallick, B. Necessity of Acceptance? Searching for Sustainable Community—Based Disaster Mitigation Approach—The Example of A Coastal City in Bangladesh. In *Solutions to Coastal Disasters 2011*; American Society of Civil Engineers: Reston, VA, USA, 2011; pp. 753–766.
79. Breitling, J. *Conservation Sells, but Who's Buying? Analyzing Market Based Approaches to Conservation*; The University for Peace: Ciudad Colón, Costa Rica, 2016.
80. Mariki, S.B. Commercialization of Nature: Can Market-Based Mechanisms Deliver Positive Conservation and Development Outcomes? *Open J. Soc. Sci.* **2016**, *4*, 61–69. [CrossRef]
81. Rao, P.K. *Climate Change Loss and Damage: Economic and Legal Foundations*; Springer Briefs in Climate Studies; Springer: Berlin/Heidelberg, Germany, 2013.
82. Van Riet, G. *The Institutionalisation of Disaster Risk Reduction: South Africa and Neoliberal Governmentality*; Routledge Studies in Hazards, Disaster Risk and Climate Change; Taylor & Francis: Didcot, UK, 2016.
83. Razzaque, J. Payments for Ecosystem Services in Sustainable Mangrove Forest Management in Bangladesh. *Transnatl. Environ. Law* **2017**, *6*, 309–333. [CrossRef]