Strengthening national adaptation in dealing with Mega Sea level rise migration in Indonesia

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Abstract. Sea level rise because of global climate change is underway, causing substantial threats for many coastal areas in the world. The threats such as displacement of people and disruptions of coastal habitats and environments are more immense in Indonesia – an archipelagic state possessing roughly 17,000 islands – as it is vulnerable geographically and economically. However, movement of people and coastal habitats and environments to rescue themselves can be considered an effort of adaptation as if it is succeeded. Thus, it needs for to be prepared and strengthened. Using a literature analysis by collecting and selecting data and information regarding to climate change, especially rising sea level and its adaptation in Indonesia, the author finds several facts and ways to strengthen migration processes. There are many issues that need for attention such as economy and livelihood, land availability, water security, food security, social – culture, infrastructure, health and the environment. To prepare and strengthen this adaptation (migration) processes, there are several measures can be done regarding to people impacted (get displaced), host communities and coastal habitats and environments. There are also some roles should be taken by governments to support and enhance the success of the migration.

1. Introduction

1.1. Climate change and sea level rise

Humans affect the Earth’s atmosphere, causing global climate change that will affect our environment and community for centuries to come. Global climate keeps on changing dynamically compared to natural variation rate in climate that has happened during Earth’s history. There are many indications that this change is already taking place: temperatures are rising, rainfall patterns are changing, glaciers are receding, snow is falling, spring is arriving earlier, the range of plants and animals is shifting, the upper ocean content is heating up, hazard events such as storms, floods and cyclones are intensifying and more frequent, sea level rise, as well as other climate variables change [1].

The rise of sea level has been demonstrated by tidal gauges around the world. This rise is due to rising global temperature that melts ice mass on Earth, especially in Antarctica and expands sea water masses [2]. Statistical analysis of tidal data shows that world mean sea level has increased by around 20-23 cm since 1880, with rates of increase of around 12-15 mm / decade. However, sea level has been rising faster about 3 cm/decade since the early 1990s as recorded on the data from both gauges and satellite altimeters, resulting approximately rising of global sea level as high as 8 cm since the beginning
of 1990s. Practically, two-thirds of rising of sea level has been measured since 2005 shows that there is increase in ocean mass, mostly from melted ice sheets on Earth; the remaining one-third of this increase is change in variation of water density due to increasing ocean temperatures. Compared to 2000, Global Mean Sea Level (GMSL) is very anticipated to increase as high as 9-18 cm in 2030, 15–38 cm in 2050, and 30-130 cm in 2100 [3].

Rising global sea levels and its regional variabilities imposed due to atmospheric and oceanic circulation patterns, while it contributes to a prominent increase in annual tidal frequency and coastal erosion, depth and breadth, and are related to the impact of small infrastructure to date. Unfortunately, the frequency of impact of such an event seems to be accelerating [4]. This condition coupled with of sea water temperature rise will threaten coastal habitat and ecosystem [5] as well as human activities and infrastructures.

In Indonesia, an archipelago with more than 17,000 islands, global sea level which is predicted to rise about 3 to 5 millimeters per year, will pose some of the worst threats [6]. It will accelerate loss of Indonesia's coastline, islands, and related ocean resources, such as coral reefs, mangrove ecosystems, and fisheries [1]. It also threatens the existence of thousands of small islands in Indonesia with the potential to submerge more than 2,000 islands and other lowlands [7]. In the past 15 years, Indonesia has suffered the loss of 29,261 ha of coastal area, relatively wide as Jakarta and about 895 ha of new coastal land are formed each year due to natural sedimentation. Based on the study conducted by Ministry of Maritime Affairs and Fisheries, Indonesia is losing roughly 1,950 ha of coastal area every year because of erosion [7]. In addition, other areas are potentially considered uninhabitable due to saltwater intrusion into freshwater resources, inundation, and the risk of irreversible flooding [5]. In accordance with the new projections that double the UN benchmark, tens of millions of people in the world, including in Indonesia, face massive displacement by the end of this century because of this condition [8].

1.2. Indonesian majority are living in vulnerable areas

Geographically, Indonesia is located in an area prone to rising sea levels along with other South and Southeast Asia - where around four from every five people affected by rising sea level by 2050 will live [9]. Indonesia is more frequent to be hit by hydrometeorological hazards as the consequence of climate change which it is related to low sea-levels, its proximity to the equator, as well as the archipelagic configuration. Besides, Indonesia seems to have high economic vulnerability [1]. Indonesia is an emerging country with GDP per capita 3,932.21 USD in 2018 [10]. Thus, Indonesia has low capacity to face and adapt towards the impacts of climate change. The capacity of climate change adaptation affects how climate change influences individuals, communities, states, and the whole population [1].

The most vulnerable area to climate change, especially in Indonesia, are flood plains and coastal areas, while the most vulnerable people are those who live in this area and those who rely on climate-dependent fisheries or agriculture [1]. Communities in coastal area seems to be the most vulnerable cluster group due to land subsidence and tidal flood as well as changes in the coastal environment. This includes losses and damage on property because of flooding and permanently submerged land, causing increased costs for rehabilitation and migration [11].

Based on the government estimation, about 60 percent of the total population - or nearly 150 million people – occupy coastal areas or low-lying land of coastal cities such as Surabaya and Jakarta. In addition, authorities estimated that 305,596 people occupied on small remote islands in 2016 [7]. As a consequence of sea level rise, the number of people flooded by sea water annually is increasing. Considering the country's high vulnerability towards climate change, one can suggest that Indonesia must take mitigation measures earlier than others to reduce a very large impact. In addition, the country must improve its ability to adapt to sea level rise that is already happening, especially in the most vulnerable communities and fragile ecosystems [1].

1.3. Denials of public members and ignorance of government
In spite of the fact that the climate change effects are very clear in Indonesia, and many experts have predicted the dire consequences of climate change in Indonesia, many Indonesians still do not convince in climate change. Indonesians constitute the largest number of people who disagree the idea of climate change caused by humans, compared to other countries in the world. This fact illustrates the great challenges to tackling the problem of climate change in this country [12].

Not only coming from the general public, challenges to overcome climate change come from the government. The Indonesian government does not prioritize this issue as seen in the debates in Indonesia's presidential elections in the 2014 and 2019 elections. During the debate, two presidential candidates, Joko Widodo and Prabowo Subianto did not put climate change at the first priority. In addition, the Indonesian government is relatively unprepared to face the consequences [12]. At present, the Indonesian government is still busy with political stability triggered by small-scale migration, but they are not horrified by this thinking and are not prepared that the in the next migration of tens of millions of people prone to get displaced because sea water that swallow people's lands [13].

This condition can be represented by what is happening in Jakarta, Indonesia's current capital. Although problems because of sea level rise have been felt and some parts of the city especially along its northern coastal areas are sinking, Jakarta provincial government still prioritizes infrastructure development and economic activities and it continues to focus its development throughout these areas. As an example, the government do reclamation for seaside cities and a number of new property developments. Unfortunately, people continue to move to these vulnerable areas and buy properties that are threatened by sea level rise. Another bad news is that the Jakarta provincial government gives little attention on this issue, particularly the mitigation and adaptation program and how to deal with possible migration change climate in the 2030 Spatial Plan [14].

2. Materials and Method

This study uses a literature analysis by collecting and selecting data and information regarding to climate change, especially rising sea level and its adaptation in Indonesia. The information and data were obtained from many reliable published journals, governmental documents, international and other organization reports and news from many well-known news agencies in the world.

This study prefers to use term “migration and migrants” rather than “refuge and refugee” following term used by [15]. Although the term “climate refugees” is frequently used for forced migration in the field of environment and climate change, this is not a lawfully valid terminology because the 1951 Refugee Convention does not acknowledge environmental factors as a parameter to qualify a refugee. To define a refugee someone needs to be fleeing persecution. Thus, people displaced due to climate change are usually defined as migrants or displaced people [16]. [16] defined:

2.1. **Environmental migrants** as “persons or groups of persons who, predominantly for reasons of sudden or progressive changes in the environment that adversely affect their lives or living conditions, are obliged to leave their habitual homes, or choose to do so, either temporarily or permanently, and who move within their country or abroad.”

2.2. **Displacement** as “A forced removal of a person from his or her home or country, often due to armed conflict or natural disasters.”

2.3. **Environmentally displaced person** as “Persons who are displaced within their country of habitual residence or who have crossed an international border and for whom environmental degradation, deterioration or destruction is a major cause of their displacement, although not necessarily the sole one. This term is used as a less controversial alternative to environmental refugee or climate refugee that have no legal basis or raison d’être in international law, to refer to a category of environmental migrants whose movement is of a clearly forced nature.”
3. Result and Discussion

3.1. Adaptation to sea level rise

Rapid changes of the Earth's climate are underway, and more shifting are expected, even under the best scenario of reducing the emission from greenhouse gases. It is clear by the recent trends and future projections in which our world in the future will be very different through what we have experienced for centuries ago, when our conservation traditions developed [17]. In all places from Asia and Africa to Europe and America, sea-level rise that needs more effort to mitigate is undergoing. However, because it already poses an existential threat to coastal communities everywhere, we also need to prepare for a new kind of adaptation [9].

Adaptation can be explained as "an adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities" [15]. Climate change adaptation can also refer to strategies which aim to be prepared for and cope with the climate change effects. It emphasizes on assisting people and natural systems to prepare for and cope with the climate change impacts [17]. As sea level rise because of climate change had not been experienced by modern humans during their lifetime, looking exclusively on what had happened in the era of our parents and predecessors to guide their adaptation seems not helpful. Otherwise, we have to anticipate a significantly different and uncertain future [18] by incorporating information on recent and future climate conditions and doing everything possible based on the best knowledge and skills they have into guidelines, manuals, practices, and policies to reduce risk and unfavorable impacts [19].

In formulating and implementing adaptation practices, there are several aspects of adapting to global climate change – especially sea level rise that are new and need to be considered [20]:

1. Climate change is an unprecedented climate conditions that have already and will soon be experienced by most regions in modern human history.
2. Climate change will have unprecedented rate of change in modern human civilization, which will be particularly challenging to build adaptation to those changes.
3. Currently, humans already own unprecedented knowledge and real-time climate monitoring in the whole world that will enable planned, and even proactive, adaptation.
4. We need to develop unprecedented methodology to face climate change as we are not well equipped for coping with the uncertain, complex, and dynamically growing hazard of global climate change.
5. There are many new actors that have commonly believed that regional climate is essentially stationary. This simplified assumption is no more valid out of global climate change and we need to change this paradigm.
6. We have a lot of new measures that maybe were unimaginable before.

By considering the six aspects mentioned, we can better develop our as well as other natural components’ adaptive capacity to sea level rise. The adaptive capacity is related to the ability of a species, habitat, or ecosystem to cope with the impacts of climate change with minimum disruption. In general, adaptive capacity can be considered as certain internal trait factors, such as the species ability to move physically to seek for better habitat conditions, adapt evolutionarily, or adjust their behavior when climate changes [17].

3.2. Migration – an undeniably sea level rise adaptations strategy

Difficult decisions lie ahead for Indonesia as it faces challenges brought by climate change, coastal erosion, saltwater intrusion into coastal aquifers, rising sea levels, storm surge, and extreme weather. The conditions can derive in other consequences such as land degradation and loss of critical declines in water resources, food security, socioeconomic, educational and health opportunities [21]. Indonesia is a country who possess high climate vulnerabilities and limited adaptive capacities at the same time hence sea level rise might not leave other choice rather than to evacuate residents from coastal areas and small islands to higher and safer regions [22]. This apparently will affect migration by displacing a lot of people living in vulnerable areas in numbers never seen in written history [23]. This serious yet nontraditional phenomenon that will bring a lot of consequences. If not taken carefully, it can lead to
social destabilization within countries and in neighboring countries that can threaten regional and international security and stability [21].

However, environmental migration because of sea level rise can be identified as a form of adaptation [23], especially when it is successfully saving people, habitats and other environments from its dire consequences [24]. Better than that, people migrating because of the no longer ability of their homeland to support their lives can find better opportunities to develop themselves in new places. Nonetheless, this is not a suggestion for people, families, and communities to respond to climate change by suddenly leaving their affected homeland, or such a movement that will be a straight result of climate change [5].

3.3. Impacts of mega sea level rise migration

3.3.1. Economy and livelihood. Sea level rise will bring about big impacts on Indonesian economy. As over 80 percent of industrial sites currently is situated in coastal areas [7], sea level rise will extensively affect chain of good productions and economic activities of the industries. Unfortunately, as many industrial and economic centers prefer to locate themselves in the areas – supported by relatively good accessibilities and shipping infrastructures, more people are attracted to settle in the areas [14]. This makes the areas packed with both production, transportation and consumption activities. If not managed carefully, this will generate a massive loss of economy that will affect the livelihood of the people.

A small yet strike example of this can be seen in what happened in Kelurahan (Village) Muara Baru, North Jakarta. This area was severely affected by extensive flood because of tidal and sea level rise in 2007. Over 4,000 houses were flooded by at least two meters of water that made a bunch of household properties were damaged extensively. In addition, livelihoods of locals were also affected in which businesses and fisheries lost up to half of their earnings and approximately 90 per cent of the affected population were unable to work [14]. Unfortunately, in the future, this condition can be much more frequent with much deeper consequences. In the worst scenario, where people are permanently displaced from coastal areas where they used to do work in activities related to sea and coastal environment, they can no longer do the same thing as they move inland. In other words, moving inland means losing access to livelihoods [25].

Beside industrial, sea level rise threatens freshwater supplies, subsistence fishing, agriculture, coastal tourism, and human settlements through flood, storm, or erosion damage to beaches and beachfront properties. Economic disruption in those areas are much greater relative importance and could cost Indonesian coastal communities thousands of jobs and billions of Rupiah [26]. In addition, sea water rise also drops coastal property market price. This condition is double burdened by many individuals and communities who have to pay higher costs for property maintenance and reparation in the face of more intense coastal hazards [27].

3.3.2. Land availability. It is well-understood that rising sea level habitually leads to submergence and erosion of lands in coastal areas and causes retreat of the shoreline landwards (shoreline recession) especially on sandy coasts [28]. At present, about 70% of the world's beaches (including in Indonesia) are eroded and less than 10% extend to the sea. Coastline recession occurred at a rate of 100 times of the amount of rising sea level. This is equal to about 50 m of land erosion because of sea level rise of 0.5 m [29]. This condition will reduce the availability of land mass that is hospitable for human. Rising sea level and coastal erosion will also exacerbate flooding and the impacts of coastal storms in Indonesia [30]. This will further push people landwards to settle in safer areas. It means that the available place to live is shrinking.

The impacts of this condition to thousands of small islands in Indonesia are more devastating. People need to move to a bigger and more protected islands. As people move, they will occupy areas that were previously available for other purposes. The more severe the impacts of rising sea level, the more area of land needs to be provided for them and for other purposes to support their life. This of course pose a significant challenge for the availability of land. If not prepared and managed carefully, this will generate land conflicts that have broader consequences.
3.3.3. Water security. Human needs water with certain characteristics for their daily purposes. However, the majority water on the Earth is non-potable leaving only small percentage that is accessible and potable. Besides, quality of water is easily changed such as by salinity increase that will make water become non-potable.

As rising sea level occurs, there is increase of salinity of coastal aquifers and river estuaries due to saltwater intrusion into fresh water [31]. This makes both ground and surface water [32], too salty for human consumption or use [33] and reduces crop yields and the availability of safe drinking water [31]. Unfortunately, it is predicted that saltwater intrusion would likely expand farther inland at an accelerating rate over time [34] that will bring more threats on water security.

The effects of this are more severe in Indonesian many small islands. Beneath small islands, there is presence of groundwater pool known as freshwater lens, which is a main water resource for the island people. This freshwater lens of which the volume of the lens changes depending on the island configuration above the sea water. The lens of the freshwater may shrink if inundation and erosion due to rising sea levels reduce the area of the island. This reduction in already water scarce islands will threaten the availability and the security of water in the place [32].

3.3.4. Food security. Coastal areas in Indonesia are places where thousands of farmers do their agricultural activities [1]. As rising sea level leads to salt-water intrusion and increases salinity in agricultural land [35], many crops will not produce optimally. In some worse scenarios, crops will die and result in a massive loss of food production. This is because in agriculture, salinity is one of the most critical parameters influencing the crop productivity. Most crop are vulnerable towards high salinity that exists in the soil [36].

Not only would agriculture get impacted by sea level rise, Fisheries industries especially aquaculture, which supply 60 percent of domestic fish would also suffer. In Indonesia’s 12 million ha of aquaculture potential [7] will be affected by rising sea level that will result in loss of aquaculture production. Overall, food production will result in less production that pose other challenges on fulfilling demand for food.

3.3.5. Social –culture. Human is a unique creature that is different from other creatures. During their lifetime and civilizations, they have developed culture and tradition. When people are displaced, the matter is not only about physically moving people to safer places, but also socio-cultural and traditional upbringing [25]. Migration is more probable to result loss and damage for affected community ancestral lands, sovereignty, language, traditional way of life, and community relationships [24].

Environmental migration brings another challenge in determining the degree in which resettled people have the right to retain and manage their traditional way of life, language, community relationships, sovereignty and identity [21]. Further, cultural differences together in situation where competition for economic support (jobs) or scarce resources is high will increase demands on social infrastructure, and rejection or distrust of host community majority. If not managed carefully, this will cause tensions between those displaced and the communities into which they move [37].

3.3.6. Infrastructure. Many coastal areas in Indonesia are packed with a conglomeration of various facilities and other built infrastructures including ports, fishery harbors, housing, tourism facilities, industries and many more. They were designed and built based on the local mean sea level, and storm surges and waves. Therefore, the buildings should be redeveloped with a set of very distinct standards or will be forced to disappear leaving huge impacts on both economic burden and social safety [32].

Another main issue is the bearing capacity effect of the ground that will reduce the stability of engineering structures and put people in risk of infrastructure failures. Decrease of stability of engineering structures is a problem for infrastructure [32]. In most coastal areas, as the soil consists of loose sediment deposit, its bearing capacity is low due to its nature. This will be exacerbated by rising sea level that will uplift the water table in the aquifers that can reduce the ground’s bearing capacity and increases the risk of liquefaction due to earthquakes. Rising sea level also increases the rate of corrosion to already built infrastructures due to high salinity of sea water [38]. Metal-origin components that are
basic components of current built infrastructures will be corroded that will make the infrastructures susceptible for failure.

3.3.7. Health. Tidal flood and storm surges triggered by sea level rise can directly increase risks of drowning and other injuries [26]. Indirectly, saltwater intrusion into fresh water that increases groundwater salinity will reduce its the availability of safe drinking water as well as increasing the risk of hypertension and diarrheal disease [31]. In addition, in areas where household wastes are accumulated in lowland near coastal areas, sea water creates ponds in some depressions of the land. The ponds if filled with the wastes for a long period might become a good environment for many kinds of bacteria, viruses and parasites to grow and breed. This will enlarge the possibility of human infection and many other diseases.

3.3.8. The environment. Human health, public safety, tourism, and fisheries depend on health of coastal ecosystems. Yet, transformation, degradation, stress, and loss exist in coastal ecosystems because of rising sea level and higher numbers of extreme weather hazards [28]. One of the most severe physical impacts of gradual sea-level rise is inundation and displacement of wetlands and lowlands [30] together with all ecosystem interrelating processes within the areas. This condition can cause significant reduction in main spawning ground for forage fish, which plays a critical part of the ocean food web [39], can remove nesting area for nesting species and inundate nests during incubation [40] and can expose a serious threat to the persistence of various coastal plant species by erosion, flooding, and exacerbating inundation [41].

However, human adaptation to climate change will disrupt the capacity of species and ecosystems to adapt. To adapt, coastal populations may begin to move inland in response to rising sea levels, build new homes and businesses on land that was not previously developed and will almost certainly put additional pressure on species trying to survive in the same space [42]. Thus, coastal species and habitat that refuge as seawater rise will be impeded by human built environments and activities. This condition can be seen in the adaptation processes of mangroves. Mangroves cannot persist in environments with high sea levels and more saline water, because some mangrove species breathe by their aerial roots emerging exceeds sea surface. In response to rising sea level, they will shift to higher altitudes or change species. However, because land boundaries have often been developed for anthropogenic activities, they cannot move ashore. As a result, the area of mangrove forests will be reduced [32].

3.4. Strengthening adaptability to sea level rise. Displacement because of rising sea level can have devastating impacts on those who are displaced, and those who will receive them [25]. In addition, the natural environment that will become the new settlement area also will bear a huge consequence. The environment bearing and carrying capacities are often exceeded as more people migrate. In this condition, the role and capacity of government and environmental managers to manage this unprecedented phenomenon is challenged. There is no other way to face it rather than preparing for the worst scenario while strengthening all parties that will be affected by sea level rise. By doing so, there is a little hope to minimize human losses and adverse consequences that will be borne by those who are displaced, the hosts that will receive the displaced and the environmental systems [21].

3.4.1. Strengthening impacted-community adaptability
3.4.1.1. Increasing understanding and awareness on the reality and consequences of sea level rise and climate change. Many coastal and islands people in Indonesia still do not understand the idea of global warming and rising sea level. Even though they are the first who face and bear the impacts of sea level rise, they still see that the phenomenon is a normal reality. Further, they are still not aware on what will face them in the future as sea level continues rising. Therefore, the first thing to do is equipping them with understanding of rising sea level and climate change to increase their awareness of the reality and consequences of the phenomenon, while strengthening their adaptability in face of this unprecedented event.
3.4.1.2. **Strengthening socio-cultural adaptability.** Long experience of resettlement of displaced persons has shown that dysfunctional relationship between planners and displaced groups is one of the sources of the failure of resettlement. Too oftentimes the process of resettlement is "top down" because the limited involvement of those displaced. The socio-cultural dimension of displacement and resettlement are frequently overlooked in the focus of rebuilding the livelihoods and physical infrastructures of the displaced. Displaced groups often consider themselves helpless and this weaken their resilience as well as social capital and can be a major obstacle to successful displacement schemes [43].

One way to strengthen socio-cultural adaptability is by implementing multiculturalism policies. This will support the migrants to maintain their culture and social networks, while keeping embracing the main principals of the host community [43]. By doing this, Indonesian government can reduce the loss of social and cultural capital of the displaced while helping them to adapt into a new life in a new place. There will be many more measures can be invented and implemented as government and people learn from more common environmental migration in the future.

3.4.1.3. **Strengthening skills and earn making adaptability.** The point of any resettlement project is that the livelihood level of the displaced groups is, at the very least, re-built or even improved in the destination. Yet, the destination situation may be very different from origin place so that the livelihood in the destination may differ significantly from it in the place at the place of origin [43]. Moreover, along with more climate migration, competition for economic support (or jobs) and scarce resources in the destination places increases [21]. This might put stress on urban systems, including downward stress on wages, since more people exist in the cities to work [24]. This condition calls for the displaced to acquire and to strengthen their skills to earn livelihood in any places they will end up that will support their independent life.

This effort can be done, for example, by giving the displaced about required skill and knowledge to improve their livelihoods in the destination. At the first stages, it is priority to give economic support through funding or access to jobs, related to some skills needed to build infrastructures, settlements, land clearing, preparation and so on. This assistance must be available for an adequate time to allow migrants to re-built themselves at their destination. If the support is drawn earlier, the migrants might fall into poverty [43].

3.4.2. **Strengthening host community adaptability**

3.4.2.1. **Increasing understanding and awareness on the reality and consequences of sea level rise and climate change.** Almost the same as what is happening on the displaced community, broader communities in Indonesia – especially those who will become host of the migrants – have lack of understanding and awareness about climate change – especially sea level rise, its consequences and what to do to face this reality and how to become a good host for those who are displaced. If this condition continues, they will not be ready to face a shocking wave of migrants and other events that will follow sea level rise. Thus, their understanding and awareness of this unprecedented event should be increased.

3.4.2.2. **Strengthening socio-cultural adaptability.** In most resettlement cases, well-established communities exist in the destination, and it is common that these locals are influenced by the incoming of displaced communities [43]. In some cases, the host community majority reject or distrust the incoming migrants. This condition will lead to failures in the resettlement process that will affect migrants as well as host communities. To reduce this possibility to happen, more interventions by host community government [21] by preparing and strengthening the host community socio-cultural adaptability are needed. Host communities need to be educated and be explained that the migrants need for protection and new livelihood, and that migrants have different social and cultural characteristics. If needed, migrants and hosts should compromise on certain things that might need major cultural changes. Another way can be to develop a post-migration community that will require integration with heavy consequences such as unavoidable risk of losing the language, identity and culture of the migrants and
host communities [21]. By giving such understanding, there is a hope for a better process of resettlements that will become a new norm in the future.

3.4.2.3. Strengthening skills and earn making adaptability. Ideally, host communities, like the displaced, do not experience decline of livelihoods due to resettlement. Their rights must be fully recognized, they must be properly compensated for the property loss and there is no hostility or practice that might offend any group [43]. However, this ideal condition may not be achieved as competition for land, livelihood and jobs will become stricter. It is possible that the displaced have more skills and knowledge to get jobs and better livelihood while the locals are forced aside because of a lack of knowledge and skills. If this happens, there will be a huge tension or even hatred and conflict between these two communities. Therefore, equipping host communities with better knowledge and skills to earn living is essential. By doing so, there will be an equitable chance for the two to have a better future while reducing negative consequences that might happen.

3.4.3. Strengthening coastal habitat and environment adaptability. Beside imposing a huge impact on human life, sea level rise also poses dreadful impacts on the sustainability of coastal habitats and environments on which thousands even millions of people of Indonesians rely their life. In other words, protecting their sustainability of increasing coastal habitat and environment adaptability is as important as protecting and strengthening coastal humans’. Protecting coastal habitat and environment can upgrade community and ecosystem resilience to sea level rise, help to ensure their health and vitality, and decrease both direct and indirect impacts of sea level rise [27].

In the process of strengthening coastal habitat and environment adaptability, there are several basic tenets that need to be considered [39]:

1. Account for global warming. Overcoming non-climate pressures will help habitat and ecosystem survive, but explicitly considering rising sea level and other impacts of climate change will be needed to assure the “everlasting” adaptive efforts for this potentially long-term devastating event. There are several strategies that must be considered: including prioritizing ecological-based interests projects and vulnerability to rising sea level; extending the restoration area to support habitat migration; restoring various types of habitats; and addressing other factors that affect how coastal habitats and environments will respond to sea level rise.

2. Explicitly consider sea level rise projection uncertainties. Future sea level rise projections will always be followed by some level of uncertainty. Thus, many measures taken should also consider many possibilities that will come.

3. Incorporate sea-level rise in coastal development plans. Rising sea level and its impact on coastal habitats and environments must become a main priority in future development planning. Various steps can be conducted to protect coastal habitats and environments, including preventing development in coastal areas, preserving ecological buffering to allow migration of terrestrial habitat, and increasing coastline protection by recognizing negative consequences for coastline habitat.

3.5. Government role
Adopted from [44], there are at least four steps that Indonesian government can take to improve its people and coastal habitat and environment adaptability to sea level rise.

3.5.1. Improving the quality, accessibility, and usability of sea level rise hazard and risk information.
Understanding sea level rise, its hazards and risks is the most fundamental factor for the success of sea level rise migration. However, this is what lack from many Indonesians that need to be address. The government can reduce this issue by improving and extending the quality, accessibility and usability of this information. Indeed, this is a difficult task as Indonesia has a vast land separated by seas that will impede the effort. However, this impediment should not stop the effort.
3.5.2. Increasing investment in adaptation-focused research and development (RD). Many Indonesians and Indonesian government in many levels still utilize traditional and conventional measures based on knowledge of what happened in the past. However, many experts have warned that this unprecedented issue should not be address by relying on the knowledge and measures learned from the past events. There is no other way to prepare this unprecedented global phenomenon except by increasing investment for research and development for sea level rise adaptation with its many uncertainties and consequences that will different from they were in the past.

3.5.3. Planning for the public and private economic costs of adaptation. Sea level rise will directly bring a huge economic loss. Besides, other impacts on many sectors can indirectly generate other economic losses. Further, adaptation effort also needs a huge cost that sometimes hard to estimate. Thus, an examination of budget planning, including who will bear the cost should be done carefully.

3.5.4. Formulating and strengthening policies and plans related to adaptation. Environmental migration processes will cause many challenges (conflicts) especially between the displaced and host communities that if not regulated carefully will thwart the success of adaptation. Until today, Indonesia has no proper plans and policies related to environmental migration. If not formulated soon, this will bring many problems in the future as more are forced to migrate. This calls Indonesian government to immediately formulate policies for the unregulated aspects and possibilities of migration as well as strengthening and improving the existing policies.

In addition, Indonesian government, both local and national can assist the processes of environmental migration as it can affect many parties either involved directly in the process or not. If poorly managed, migration (displacement and resettlement) can damage rather than increase social security; and without recognition of equality and rights issues, such strategies can ultimately make the poor poorer and more vulnerable [37]. Besides this, the poor may often be unable to travel because they are unable to afford it as their data and networks are often restricted to possible destinations. Relatives and friends are less likely to live elsewhere in many cases. In this case, it is necessary to provide government support and assistance to facilitate their migration [43].

Governance is central to how to manage the impacts of rising sea level and how to improve resilience and human safety choices [37]. A policy is needed to help the displaced people in all their forms return their capital. Then, as a part of the adjustment process, the displaced people need to help build their social and cultural capital at their destination. This can be encouraged by the restoration of groups as a cohesive community at their destination [43].

In the resettlement process, it is also important that the host community does not feel excluded or discriminated against by not having access to equal resources. A clear distinction must be made between infrastructure and services delivered on a temporary basis to encourage improvements and long-term changes. Locals and immigrants must have access to the latter. In addition, involving the destination community in all migration processes especially in the resettlement phase is important in terms of considering their interests, and utilizing their local experience and knowledge to assist in resettlement. Host community needs to be fully involved, including through consultation. Not doing so risks dissatisfaction and hatred within the group which can then mobilize effective opposition to the resettlement [43].

4. Conclusion
Sea level rise because of global climate change is underway, causing substantial threats for many coastal areas in the world. The threats are more massive for Indonesia as it is vulnerable geographically and economically. It is an archipelagic country with more than 17,000 islands and with GDP per capita only 3,932.21 USD in 2018. With average increase of 3 to 5 millimeters in sea level, there is a high likelihood that this will lead to the loss of Indonesia’s coastline, lowland areas and small islands due to submerging processes. There is also a possibility of the loss of other related marine and coastal habitats and environments together with their dynamics and components. This problem is more challenging as
Indonesia is a home of many climate change denials and political leaders that are not aware nor pay full attention to this issue. As consequences, millions of people living in the coastal areas and small islands are vulnerable and will possibly get displaced as their previous homeland is unhospitable anymore. This condition will not only affect the displaced, but also host communities in the destination places. As more migrants settle in new destinations area, conflicts and hatred due to competition to livelihood (jobs), space and other natural resources might arise. Due to this condition, there are many issues that need for attention such as economy and livelihood, land availability, water security, food security, social – culture, infrastructure, health and the environment.

Even though displacement is a negative consequence of sea level rise, this process can be seen as a form of adaptation that need to be prepared and strengthened. The preparation and strengthening process will improve the chance of its success that will save millions of the displaced and support their thriving in new places. In addition, coastal habitats and environments also need another consideration as millions of Indonesian people rely their live on. If they are completely destroyed by sea level rise, humans could also be possibly destroyed as they loss a big factor that can support their lives. Thus, the adaptability of coastal habitats and environments should also be strengthened.

To prepare and strengthen this adaptation (migration) processes, there are several things can be done:
1. Strengthening impacted-community adaptability by increasing their understanding and awareness on the reality and consequences of sea level rise and climate change; strengthening socio-cultural adaptability; and strengthening skills and earn making adaptability.
2. Strengthening host community adaptability by increasing their understanding and awareness on the reality and consequences of sea level rise and climate change; strengthening socio-cultural adaptability; and strengthening skills and earn making adaptability.
3. Strengthening coastal habitat and environment adaptability by considering several tenets: accounting for global warming; explicitly considering sea level rise projection uncertainties; and incorporating sea-level rise in coastal development plans.

For this purpose, Indonesian government both local and national has several roles. The government should enhance the reliability, availability, and usability of sea level threat and risk information; increase investment in adaptation-oriented research and development (RD); prepare for adaptation’s public and private economic costs; and formulate and reinforce adaptation policies and plans. Besides, the government should facilitate and assist the processes of the migration.

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