Asian Journal of Management Entrepreneurship and Social Science
ISSN: 2808 7399
https://ajmesc.com/index.php/ajmesc Volume 03 Issue 04

The Impact of Mangrove Destruction on the Economy and Advocacy Efforts for Mangrove Conservation in Indonesia

Zainal Arifin[1], Andi Yusapri[2], Arief Rachman. B[3], Suherman[4], Bambang Sasmita Adi Putra[5]

[1,2,3,5] Universitas Islam Indragiri
[4] Universitas Muhammadiyah Jambi

Coresponding author-email: *[1]zainal.arifin@unisi.ac.id,

abstract

` *This research delves into the multifaceted impact of mangrove destruction on Indonesia's economy and examines advocacy initiatives for mangrove conservation, employing a qualitative literature review methodology. The primary objective is to comprehensively understand the economic consequences of mangrove degradation, especially in coastal communities highly dependent on mangrove ecosystems. This study positions itself within the existing research on environmental degradation and its socioeconomic ramifications, with a particular focus on mangroves. The research involves an extensive review of qualitative literature sources, including academic articles, reports, and case studies. The main findings highlight the significant economic losses incurred due to mangrove destruction and emphasize the urgency of conservation efforts. Additionally, this study contributes to the body of knowledge by shedding light on the complex interplay between environmental degradation and economic vulnerabilities in coastal regions, underscoring the need for sustainable policies and community engagement in mangrove conservation.*

Keywords: Mangrove, destruction, economic, conservation, advocacy.

1. INTRODUCTİON

Mangroves are coastal ecosystems that play a crucial role in maintaining ecological balance, protecting coastlines from erosion, and providing habitats for various species of flora and fauna. In Indonesia, mangroves hold a strategic role in supporting the livelihoods of coastal communities, particularly in the sectors of fisheries, tourism, and industry (Karminarsih, 2007). However, regrettably, the destruction of mangrove ecosystems is on

the rise due to various human activities such as land clearance, tree cutting, coastal reclamation, and water pollution. The impacts of mangrove degradation have become a serious concern as they affect various aspects of the lives of coastal communities in Indonesia. Economically, the deterioration of mangrove ecosystems leads to a decline in fishery productivity and the loss of income sources for fishermen. Furthermore, mangrove destruction can result in coastal erosion, potentially damaging infrastructure and residential areas along the coastline (Makmun, 2010).

The importance of advocacy and conservation efforts for mangroves has become increasingly urgent in addressing the challenges of ecosystem destruction. Advocacy efforts can garner support from various stakeholders, including governments, communities, and the private sector, to participate in the preservation and rehabilitation of mangroves (UNEP, 2014). Additionally, concrete steps such as halting activities that harm mangroves, stricter law enforcement against violations, and educational campaigns to raise awareness about the importance of mangrove ecosystems are all part of sustainable conservation efforts. Besides significant economic impacts, mangrove destruction also has crucial implications for the environment and coastal ecosystems as a whole. Mangroves serve as natural buffers that can reduce the impact of natural disasters such as tsunamis and tropical storms by absorbing energy from ocean waves. The degradation of mangrove ecosystems can reduce this buffering capacity, increase disaster risks, and worsen the vulnerability of coastal communities to natural threats (Karimah, 2017).

Mangroves also function as efficient carbon absorbers, helping to reduce the amount of carbon dioxide in the atmosphere and mitigate climate change. However, mangrove destruction leads to the release of carbon contained in the soil and dead vegetation, resulting in increased greenhouse gas emissions and accelerating global warming (Rahim & Baderan, 2017). Conservation and advocacy efforts for mangroves are becoming increasingly urgent due to the importance of this ecosystem in providing various benefits for human life and environmental sustainability (Erinta, 2020). The Indonesian government has taken several steps for mangrove conservation, such as declaring Marine Conservation Areas (KKL) and National Parks as protected areas for mangrove ecosystems. However, challenges in policy implementation and law enforcement still exist, especially in addressing pressure from infrastructure development and industrial expansion that could potentially harm coastal ecosystems (Soedarmo, 2018).

To achieve success in conservation efforts, active collaboration between the government, communities, and the private sector is necessary. Involving local communities in mangrove rehabilitation and conservation efforts is also a key to success. Through education and active community participation, awareness of the importance of mangrove

ecosystems can be heightened, and communities can become agents of change in preserving environmental sustainability in their surroundings (Shiva, 2005).

This research aims to investigate the impact of mangrove ecosystem degradation on the coastal communities' economy in Indonesia, particularly in the fisheries, tourism, and industrial sectors. Additionally, this study will explore advocacy strategies and conservation efforts that can be implemented to address mangrove ecosystem damage in Indonesia, involving various stakeholders. The evaluation of the active role of coastal communities in mangrove preservation and rehabilitation efforts will also be conducted to maintain the sustainability of coastal ecosystems and reduce vulnerability to natural disasters and climate change. It is hoped that this research can provide a holistic understanding of the impacts of mangrove destruction and encourage advocacy and preservation efforts as part of nature conservation and sustainable development in Indonesia.

2. RESEARCH METHOD

The research methodology for this study involves a comprehensive review of qualitative literature sources, encompassing academic articles, reports, and case studies. This method was chosen to gather a deep understanding of the multifaceted issue of mangrove destruction in Indonesia and the associated economic impacts and conservation advocacy efforts (Abdussamad, 2021). To commence the research process, an extensive search of academic databases, research repositories, and relevant websites was carried out to identify pertinent literature on mangrove destruction and conservation in Indonesia. The inclusion criteria focused on studies and reports that provided qualitative insights, analyses, and information related to the economic consequences of mangrove degradation and the advocacy initiatives aimed at mangrove conservation in the country (Sugiyono, 2016).

The identified literature sources were then meticulously reviewed, with a particular emphasis on their findings regarding the economic repercussions of mangrove loss in Indonesia (Pahleviannur, 2022). This phase involved synthesizing the qualitative data from various sources, identifying recurring themes, and drawing connections between the economic effects and mangrove destruction. Furthermore, the research delved into the advocacy efforts and strategies employed for mangrove conservation in Indonesia. This included examining the roles of different stakeholders, such as government agencies, non-governmental organizations, and local communities, in advocating for mangrove protection and rehabilitation (Sugiyono, 2019).

The research methodology also considered the involvement of coastal communities in mangrove conservation, assessing their contributions and active participation in preserving these vital ecosystems. Overall, this study employed a qualitative literature

review methodology to compile, analyze, and synthesize existing qualitative data and insights from diverse sources to provide a comprehensive understanding of the economic impacts of mangrove destruction and the advocacy endeavors for mangrove conservation in Indonesia.

3. RESULT AND DİSCUSSİON

3.1 The Impact of Mangrove Destruction on the Coastal Communities' Economy in Indonesia

Figure 1. Mangrove Ecosystem

The damage to mangrove ecosystems has a significant impact on the coastal communities' economy in Indonesia (Pranita, 2020). Specifically, the fisheries, tourism, and industrial sectors are affected by the degradation of this ecosystem (Sudarwani, 2012). In the fisheries sector, mangroves serve as a shelter for various fish species and marine life. When mangrove ecosystems are damaged, this habitat is disrupted, resulting in a decline in fish populations and marine resources. This can lead to reduced catches for fishermen, which, in turn, has a negative impact on the coastal communities' economy, as they depend on the fisheries sector as their primary livelihood (Rahmawati, Arif, Rahayu, & Akbardiansyah, 2023).

In the tourism sector, mangroves have significant ecotourism value. This ecosystem attracts tourists with its natural beauty and various activities such as kayaking, trekking, and birdwatching. However, mangrove damage can lead to the loss of ecotourism appeal and disrupt the potential income generated from tourism in coastal areas (Eppy, 2018). Thus, the tourism sector also experiences negative impacts due to mangrove degradation. The industrial sector is also affected by the damage to mangrove ecosystems. Mangroves act as a natural barrier that protects coastal areas from erosion and natural disasters like floods. When this ecosystem is damaged, coastal areas become more vulnerable to natural disasters,

which can cause significant economic losses for industries operating in those areas (Handoko, 2020).

In addition to the aforementioned negative impacts, the destruction of mangrove ecosystems can also affect the food security of coastal communities in Indonesia. Mangroves play a crucial role as a natural food ecosystem that provides various types of marine resources, including fish, shrimp, clams, and crabs. The damage to this ecosystem can reduce the availability and diversity of marine food resources, threatening food security and increasing the dependence of coastal communities on food from outside their region (Hasan, 2016). Furthermore, mangrove ecosystems also play a vital role in maintaining ecological and environmental balance. Mangroves act as efficient carbon absorbers, helping to reduce greenhouse gas emissions and mitigate climate change impacts. Additionally, mangrove roots act as coastal protectors by preventing soil erosion and reducing the risk of flooding. With the degradation of mangrove ecosystems, the loss of these natural features has implications for environmental sustainability and the quality of life for coastal communities (Rocheleau, 2015).

Therefore, the protection and preservation of mangrove ecosystems are crucial for maintaining the sustainability of coastal environments and supporting the economic well-being of coastal communities in the future. Conservation efforts through integrated coastal area management, mangrove reforestation, and environmental education will provide long-term benefits to the lives of coastal communities. The support of the government, private sector, NGOs, and civil society in implementing advocacy strategies and preservation efforts is key to success in maintaining the sustainability of coastal ecosystems and achieving prosperity for coastal communities in Indonesia.

3.2 Advocacy Strategies and Conservation Efforts for Addressing Mangrove Ecosystem Damage in Indonesia

Figure 2. Planting and socializing on mangrove conservation efforts

Environmental counseling and education play a pivotal role as advocacy strategies in the conservation efforts of mangrove ecosystems in Indonesia. By raising awareness among local communities about the significance of mangroves and their impact on the coastal economy and livelihoods, it is hoped that collective consciousness will be instilled to sustainably manage coastal environments (Siregar, Mawardi, & Rigitta, 2021). Through informative sessions, communities gain an in-depth understanding of mangrove ecosystems, their biological and ecological structures, and their role in maintaining coastal environmental balance. Targeted environmental education also involves introducing various species of animals and plants inhabiting mangrove ecosystems, fostering greater appreciation for the existing biodiversity and the need to preserve the ecosystem's equilibrium (Sunarjono, Dimyati, & Absori, 2010).

This advocacy strategy also includes imparting knowledge about the economic value of mangrove ecosystems. Communities are informed about mangroves' roles as economic resources, such as providing fish stocks, firewood, and construction materials. Environmental awareness campaigns also explore the potential for eco-tourism, which can offer income-generating opportunities for coastal communities through mangrove-based nature tourism (Agungguratno & Darwanto, 2016). In preservation efforts, environmental counseling and education also emphasize the dangers of mangrove ecosystem degradation due to excessive exploitation, pollution, and unsustainable coastal development. Communities are provided information on sustainable practices for utilizing mangrove resources without harming the ecosystem (Sugandha, Freestone, & Favaro, 2022).

These environmental counseling and education efforts are not solely directed at coastal communities but also extend to other stakeholders, including the government, industries, and non-governmental organizations (NGOs). By involving all parties, it is hoped that awareness of the importance of mangrove conservation will permeate all segments of society and be incorporated into sustainable policies and practices (Cruz & Paulino, 2022). Through a robust advocacy strategy in the form of environmental counseling and education, coastal communities are expected to be further motivated to safeguard and preserve mangrove ecosystems as a valuable natural heritage for their economy, life, and future generations. Moreover, a sound understanding of the ecological and economic value of mangroves will serve as the foundation for active community participation in mangrove conservation and rehabilitation efforts to ensure the sustainability of coastal ecosystems in Indonesia (Aliansyah & Hermawan, 2019).

Integrated coastal area management is key to mangrove ecosystem conservation in Indonesia. This endeavor involves various stakeholders, including the government, local

communities, academics, and NGOs, collaborating to integrate various aspects of coastal management holistically. One crucial aspect of integrated coastal area management is conservation. By carefully identifying and observing coastal areas that serve as mangrove habitats, conservation measures can be implemented to protect these ecosystems from degradation and harm. This can be achieved through the establishment of tightly managed mangrove conservation areas, monitoring human activities that may harm mangrove ecosystems, and conducting regular assessments of mangrove health (Suryanti, Supriharyono, & Anggoro, 2019).

In addition to conservation, integrated coastal area management also encompasses wise land use. When developing coastal areas, it is essential to consider sustainable land use practices that do not harm mangrove ecosystems. Infrastructure and facility development should be directed to minimize negative impacts on mangroves, such as selecting strategic locations that do not disrupt sensitive mangrove areas (C-17, 2017). The sustainable use of coastal area resources is also an integral part of integrated management. Responsible and sustainable natural resource use is crucial in maintaining biodiversity and marine productivity, for example, managing fisheries based on ecological and sustainability principles to preserve biodiversity and marine productivity (Caris, 2009).

Active involvement of coastal communities is also a vital factor in integrated coastal area management. Actively involving communities in decision-making related to coastal management will create a strong sense of ownership and responsibility towards mangrove conservation. Education and training for communities on the importance of mangrove ecosystems, their benefits to the economy and the environment, and preservation techniques need to be enhanced. By integrating various aspects of integrated coastal area management, it is expected to create mangrove ecosystem sustainability and support the well-being of coastal communities. Sustainable mangrove conservation efforts will provide long-term benefits to coastal ecosystems, local economies, and the quality of life of coastal communities in Indonesia.

3.3 The Active Role of Coastal Communities in Mangrove Conservation and Rehabilitation Efforts in Indonesia

Figure 3. local wisdom in mangrove conservation

Awareness and participation of coastal communities are crucial pillars in the efforts to conserve and rehabilitate mangroves in Indonesia. Awareness of the importance of preserving the mangrove ecosystem as a source of life and its role in addressing climate change serves as a strong foundation for the success of these preservation efforts. Active participation of coastal communities is highly necessary in the mangrove conservation process. Coastal communities possess local knowledge and a deep understanding of their surrounding environment, including mangroves (Nebert, 2004). Their participation in various conservation activities, such as mangrove planting, ecosystem monitoring, and conservation area management, can make a significant contribution to maintaining the sustainability of the coastal ecosystem.

Awareness and community participation can also be enhanced through educational approaches and awareness campaigns. Outreach programs and training on the importance of mangrove preservation, its benefits to communities, and mangrove rehabilitation techniques can provide better understanding to the local population (Susmoro, 2017). With adequate knowledge, communities can become more conscious of the impacts of mangrove ecosystem destruction and more motivated to engage in preservation efforts. The importance of involving local communities in decision-making regarding mangrove management should also be emphasized. Active community participation in the planning and implementation of preservation programs creates a sense of ownership and responsibility towards their environment. By being involved in decision-making, communities can have a greater stake and motivation in protecting and caring for the mangrove ecosystem (Pribadiningtyas, Said, & Rozikin, 2017).

In the long run, awareness and active participation of coastal communities in mangrove preservation and rehabilitation will yield significant benefits for the sustainability of coastal ecosystems. Healthy mangroves offer various benefits to communities, such as livelihoods from fisheries, ecotourism, and protection against natural disasters (Yuwono, 2005). By collectively safeguarding mangroves, coastal communities will enjoy better and more sustainable lives, along with a sustainable environment for future generations. The importance of community involvement in resource management, including mangroves, also encompasses social and economic aspects. Through active participation in preservation activities, coastal communities can experience the direct benefits of mangrove ecosystem sustainability. For example, an increase in fish populations and abundant catches from healthy mangrove areas will have positive economic impacts on fishing communities (Khan & Han, 2018).

Sustainable economic empowerment is a key strategy in mangrove preservation efforts in Indonesia. Enhancing the economic empowerment of coastal communities through sustainable mangrove resource utilization can motivate them to actively participate in preservation efforts (Goos & Manning, 2007). By providing opportunities for coastal communities to develop ecotourism-based businesses and sustainable fishery management, they become more engaged and play a significant role in maintaining and preserving the mangrove ecosystem. One form of sustainable economic empowerment is the development of ecotourism potential related to mangroves. Coastal areas with healthy mangrove forests have significant tourist appeal. By developing sustainable ecotourism initiatives, such as involving local communities as tour guides and crafting environmentally friendly handicrafts, coastal communities can earn additional income from the tourism sector. In this way, mangrove preservation becomes essential for communities as it can enhance their economic potential (Song, Tan, Wang, & Shen, 2022).

Sustainable mangrove resource utilization can also be achieved through responsible fishery management. Coastal communities often rely on fish catches as their primary source of livelihoods (Ganda, Damayani, Luthfia, & Harefa, 2023). By recognizing the importance of maintaining the mangrove ecosystem as a breeding ground and habitat for fish, communities are more likely to adopt sustainable and environmentally friendly fishing practices. For example, by reducing the use of destructive fishing gear and adhering to regulations related to sustainable fishery management. Through sustainable economic empowerment, coastal communities will experience the direct benefits of mangrove ecosystem sustainability. Income generated from ecotourism and sustainable fisheries will improve their well-being and reduce pressure on natural resources. With an awareness of the close relationship

between their economic well-being and mangrove preservation, communities will be more motivated to protect and conserve the coastal ecosystem that serves as their source of life.

3.4 Coastal Community Economic Alternatives to Support Mangrove Conservation

Figure 4. economic activities in mangroves

Facing the impact of mangrove destruction on the coastal communities' economy in Indonesia, it is essential for them to explore sustainable economic alternatives to support mangrove conservation efforts. One option that can be explored is the development of mangrove-based ecotourism. By utilizing the uniqueness and beauty of the mangrove ecosystem, coastal communities can attract both local and international tourists to visit the mangrove areas and offer various ecotourism activities, such as nature tours, mangrove river boating, and learning about the biodiversity present (Travassos, Coelho, & Arends-Kuenning, 2021). This approach can not only generate additional income for coastal communities but also raise awareness among both the local population and visitors about the importance of preserving mangroves. In addition to ecotourism, the development of handicraft businesses and natural products made from mangrove wood can also be a sustainable economic

alternative. Coastal communities can process unproductive mangrove wood into various creative products, such as handicrafts, furniture, or decorative items. Using non-utilized mangrove wood to avoid deforestation can contribute to mangrove ecosystem preservation. Moreover, these mangrove-based products also have attractive market potential, especially for tourists looking for coastal region souvenirs (Wahyudi, 2015).

The development of sustainable agriculture or aquaculture is also an economic alternative that coastal communities can consider. By utilizing the available land potential around the mangrove areas, coastal communities can develop environmentally friendly agriculture, such as organic farming or sustainable fisheries. By maintaining the balance of the mangrove ecosystem, agriculture and aquaculture can proceed sustainably without harming the surrounding environment (Kusumastuti & Rouli, 2021). Active participation of coastal communities in decision-making and the implementation of economic programs will enhance their sense of ownership and responsibility for the success of mangrove conservation efforts. Building strong awareness and understanding of the long-term benefits of mangrove preservation, communities will be more motivated to support and protect the ecosystem. Education and social campaigns can also play a role in educating the public about the importance of mangrove preservation and how these economic alternatives can lead to long-term sustainability and prosperity (Haleem, Javaid, Qadri, & Suman, 2022).

In facing these economic changes, it is crucial for coastal communities to receive support and access to the knowledge and technology needed. Governments and non-governmental organizations can play a role in providing training and guidance to help coastal communities develop sustainable economic alternatives. Policy support and incentives from the government can also encourage the adoption of mangrove-based conservation efforts that economically benefit communities and the environment. Thus, the development of sustainable economic alternatives can be an effective solution to support mangrove conservation and address the challenges of ecosystem destruction impacts on coastal communities in Indonesia.

4. CONCLUSİON

The destruction of the mangrove ecosystem in Indonesia has severe economic consequences for coastal communities. Mangroves are vital for the fisheries, tourism, and industrial sectors in these areas. Their destruction leads to reduced fish catches, decreased tourism attractiveness, and losses for industries reliant on mangroves. To address this issue, advocacy and conservation efforts are essential. Advocacy raises public awareness about preserving mangroves, their impact on the coastal economy, and environmental education is crucial. Integrated coastal area management, involving stakeholders, is key for

sustainability. Coastal communities' active involvement is pivotal. With awareness and participation, they can monitor ecosystems, plan and implement rehabilitation, and collectively manage mangrove resources, contributing significantly to preservation.

REFERENCES

Abdussamad, Z. (2021). *Metode Penelitian Kualitatif.* Makassar: Syakir Media Press.

Agungguratno, E. Y., & Darwanto. (2016). Penguatan Ekosistem Mangrove untuk Pemberdayaan Ekonomi Masyarakat Pesisir. *EKO-REGIONAL, 11(1)*.

Aliansyah, H., & Hermawan, W. (2019). Peran Sektor Pariwisata pada Pertumbuhan Ekonomi Kabupaten/Kota di Jawa Barat. *Bina Ekonomi 23(1)*.

C-17, P. (2017). *Spatial Data Infrastructures "The Marine Dimension" (Guidance for Hydrographic Offices).* Monaco: International Hydrographic Organization.

Caris. (2009). *Hydrography and Marine Spatial Data Infrastructure.* Bradfield College: Near Reading.

Cruz, S. S., & Paulino, S. R. (2022). Experiences of innovation in public services for sustainable urban mobility. *Journal of Urban Management*, 108–122.

Eppy, B. (2018). Implementasi Green Building Dalam Rangka Mewujudkan Perkantoran Ramah Lingkungan Melalui Program 031 Go Green (Studi Pada Kantor Pelayanan Perbendaharaan Negara Surabaya I).

Erinta, N. (2020). Pengaruh Green Innovation terhadap Kinerja Inovasi dan Keunggulan Kompetitif yang dimediasi oleh Managerial Environmental Concern.

Ganda, R. E., Damayani, W. N., Luthfia, I. A., & Harefa, M. S. (2023). Partisipasi Masyarakat dalam Upaya Pelestarian Ekosistem Mangrove di Desa Bagan Percut Kecamatan Percut Sei Tuan Kabupaten Dei Serdang, Sumatera Utara. *Jurnal Kajian Ilmu dan Pendidikan Geografi, 6(1)*.

Goos, M., & Manning, A. (2007). The future of work: The impact of technological change on employment in the OECD. *Oxford Review of Economic Policy*.

Haleem, A., Javaid, M., Qadri, M. A., & Suman, R. (2022). Understanding the role of digital technologies in education: A review. *Sustainable Operations and Computers, Vol. 3*, 275-285.

Handoko, F. (2020). *Green Industrial System (Pendekatan Baru dalam Meningkatkan Daya Saing).* Surabaya: MK Press.

Hasan, A. (2016). Green Management System. *Jurnal Media Wisata*.

Karimah. (2017). Peran Ekosistem Hutan Mangrove Sebagai Habitat Untuk Organisme Laut. *Jurnal Biologi Tropis, 17(2)*.

Karminarsih, E. (2007). Pemanfaatan Ekosistem Mangrove bagi Minimasi Dampak Bencana di Wilayah Pesisir. *JMHT Vol. XIII (3)*, 182-187.

Khan, T. M., & Han, S. (2018). The impact of digital technology on human resource management: A review. *Journal of Economics, Business and Management, 6(1)*, 27-35.

Kusumastuti, R. D., & Rouli, J. (2021). Smart City Implementation and Citizen Engagement in Indonesia. *OP Conference Series: Earth and Environmental Science*.

Makmun. (2010). Green Economy: Konsep, Implementasi, dan Peranan Kementrian Keuangan.

Nebert, D. D. (2004). Developing Spatial Data Infrastructure: SDI Cookbook Version 2.0. *Global Spatial Data Infrastructure (GSDI), 10(2)*, 171.

Pahleviannur, M. R. (2022). *Metodologi Penelitian Kualitatif.* Sukoharjo: Pradina Pustaka.

Pranita, E. (2020, Maret 12). *Pulau Kaledupa Wakatobi Jaga Mangrove Alami dengan Kearifan Lokal*. (Kompas.com) Retrieved from https://www.kompas.com/sains/read/2020/03/12/173200923/pulau-kaledupa-wakatobi-jaga-mangrove-alami-dengan-kearifan-lokal?page=all

Pribadiningtyas, D. K., Said, A., & Rozikin, M. (2017). Partisipasi Masyarakat dalam Rehabilitasi Hutan Mangrove. *Jurnal Administrasi Publik (JAP), 1(3)*, 70-79.

Rahim, S., & Baderan, D. W. (2017). *Hutan Mangrove dan Pemanfaatannya.* Yogyakarta: Deepublish.

Rahmawati, Arif, M., Rahayu, R., & Akbardiansyah. (2023). Persepsi Masyarakat Kabupaten Aceh Timur dalam Pengelolaan Ekosistem Mangrove Berkelanjutan. *Jurnal Kelautan dan Perikanan Indonesia, 3(1)*, 45-58.

Rocheleau, D. (2015). Networked, rooted and territorial: green grabbing and resistance in Chiapas. *Journal of Peasant Studies, 42(3-4)*, 695-723.

Shiva, V. (2005). *Earth democracy: Justice, sustainability, and peace.* South End Press.

Siregar, Z. H., Mawardi, & Rigitta, P. (2021). Pengembangan dan Potensi Green Technology sebagai Energy Masa Depan di Masyarakat. *Jurnal Deputi*.

Soedarmo, S. P. (2018). *Pelestarian Hutan Mangrove dan Peran Serta Masyarakat Pesisir.* Semarang: Undip Press.

Song, M., Tan, K. H., Wang, J., & Shen, Z. (2022). Modeling and evaluating economic and ecological operation efficiency of smart city pilots. *Cities*, 124.

Sudarwani, M. M. (2012). Penerapan Green Architecture dan Green Building sebagai Upaya Pencapaian Sustainable Architecture.

Sugandha, Freestone, R., & Favaro, P. (2022). The social sustainability of smart cities: A conceptual framework. *City, Culture and Society*.

Sugiyono. (2016). *Memahami Penelitian Kualitatif.* Bandung: Alfabeta.

Sugiyono. (2019). *Metode Penelitian Pendidikan Pendekatan Kuantitatif, Kualitatif, dan R&D.* Bandung: Alfabeta.

Sunarjono, S., Dimyati, K., and Absori. (2010). Kebijakan Strategi Penggunaan Green Technology untuk Preservasi Infrastruktur Jalan Berbasis Kualitas Hidup Masyarakat. Tema: Pendidikan dan Kebijakan Teknologi dalam Pemikiran-Pemikiran Alternatif Mencerahkan Bangsa Sumbangan Civitas Akademika Universitas Muhammadiyah Surakarta. 443-468

Suryanti, Supriharyono, & Anggoro, S. (2019). *Pengelolaan Wilayah Pesisir Terpadu.* Semarang: UNDIP Press.

Susmoro, H. (2017). *Peran Pushidrosal Dalam Pembangunan Marine Spatial Data Infrastructure (MSDI) Guna Mendukung Kepentingan Pertahanan Dan Pembangunan Nasional Dalam Rangka Mewujudkan Indonesia Sebagai Poros Maritim Dunia.* Jakarta: Pushidrosal.

Travassos, G. F., Coelho, A. B., & Arends-Kuenning, M. P. (2021). Consumption patterns and demand in households headed by the elderly: evidence from Brazil. *International Journal of Social Economics, 48(5)*, 657–674. Retrieved from https://doi.org/10.1108/IJSE-06-2020-0356

UNEP. (2014). The Importance of Mangroves to People: A Call to Action. *United Nations Environment Programme World Conservation Monitoring Centre*.

Wahyudi, D. (2015). Optimalisasi Potensi Mangrove untuk Meningkatkan Perekonomian Masyarakat Pesisir (Studi Kasus Masyarakat Tambak Rejo Kelurahan Tanjung Mas Semarang Utara). *Prosiding Seminar Nasional*.

Yuwono. (2005). *Draft Pedoman Pengamanan dan Penanganan Pantai.* Jakarta: Departemen Pekerjaan Umum.