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Undertaking climate change risk reduction: a case study of Green Siak in Indonesia

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Abstract. The growing body of literature addresses the role of state and non-state actors in the programme for reducing climate change risk. Unfortunately, the research studies collaboration among the stakeholders is extremely scarce. This paper contributes to the recent debates by seeking the collaboration between local government and civil societies in taking part in the issue of reducing climate change effect. By looking in-depth at the green Siak programme in Indonesia, we portray the actors, activities, and programme collaborated and conducted along with government and non-government organizations. This research applied a qualitative approach. The data were collected using interviews and secondary sources. The results show that the local government, as the programme initiator, can develop a mutual relationship with various civil society organisations. The programme covers environmental preservation and community forestry, contributed to reducing climate change impact in the long term. In addition, the programme is also supported by the private sector, leading to complete collaboration among triangle actors (government, civil society, and private sector). The findings add to our knowledge of climate change risk reduction by considering the collaboration processes among the actors. It is also helpful to strengthen the practice of climate change mitigation.

1. Introduction

Degradation of environmental quality and function, including water, air, and natural resources, has evoked disaster risk for human beings. Many environmental degradations are led by various uncontrollable exploitation of natural resources induced by humans, such as illegal logging and mining. The degradation appears because of unintended consequences of human activities, such as housing, plantation, and industry. In other words, human activities significantly impact environmental damage directly and indirectly. In the long term, these activities can induce global warming and climate change, endangering human civilization [1].

Climate change and global warming have become international concerns long ago. United Nations encouraged Kyoto Protocol on 11 December 1997 as a strategy for dealing with climate change [2], [3]. Kyoto protocol agreed to several decisions to reduce greenhouse and carbon



dioxide emissions. At the local level, many initiatives have been carried out by the people and government to anticipate the effect of global warming and climate change around the globe [4]. One of the local endeavors is the "Siak Hijau" or Green Siak programme developed by the government of Siak Regency in Riau, Indonesia. The program aims to address the impact of climate change and global warming by formulating and implementing specific actions to achieve the goals. The programme is regulated by the Regulation of the Siak Regent No. 22 of 2018 about Siak as a green regency, containing zone, strategy, policy, and indicator toward green Siak [5].

The local community is essential in mitigating climate change and global warming. Current studies have noted the pivotal role of local government and the community in reducing the impact of climate change. The studies can be classified into two research mainstreams based on their focus. First, the research focused on the local government's role in designing various programs related to mitigating the impact of climate change and global warming [6]–[8]. The proponent of this mainstream argued that subnational governments could address the effect of climate change at the local level. Second, the study offers special attention to the local community's involvement in the issue of global warming and climate change [9], [10]. The second mainstream highlight the contribution of the local community in taking action on climate change risk reduction.

Besides the growing attention, previous studies have several limitations generating a gap in the current body of literature. First, little consideration has been provided to the collaboration between government and non-government bodies in reducing climate change and global warming programs. Empirically, various alliances have been practiced in many climate change mitigation programs [11], [12]. Therefore, we need an understanding of the collaboration and networking features among the stakeholders. Second, prior research elaborates on the case of developed countries with a long history of dealing with global warming. Thus, experiences from another world are essential to enrich our knowledge about how the making and practice of reduction of global warming initiatives in developing countries [13]. Regarding the gaps, the present study focused on the collaboration between non-state and state actors in the global warming mitigation effect program by looking in-depth at the Green Siak case.

This study, therefore, has three objectives to bridge the gap in the study of climate change risk reduction. First, it aims at understanding the reasons behind the initiation of Green Siak and the environmental background motivating the establishment of the programme. Second, this study intends to explain the multiple actors engaging in the programme and their collaboration. Finally, this work investigates the activities carried out by the actors and their impact on climate change risk reduction.

2. Methods

This research applied a qualitative case study in Siak Regency from October to December 2021. We portrayed the Green Siak programme as a single case study as recommended by Yin [14]. Although a similar programme was implemented in several regencies in Riau, we merely focused on the Siak regency. Instead of comparing with another region, we concentrated on one case, Green Siak. A dozen informants were interviewed to obtain a variety of information about the programme. They comprised CSO activists, government officials, and corporation staff in Siak Regency. This research used interview as instrument to obtain the data. The interview process of the participants was guided by interview guide lists validated by the research examination committee in Universitas Indonesia. It contained numerous questions associated with their role in Green Siak. We allowed the informants to choose not to answer a specific question if they were unwilling to answer because of personal reasons. The informants also were anonymous because of their request. The local research team in Pekanbaru assisted us in approaching and connecting the participants. More than half of the participants were interviewed face-to-face. The rest was interviewed using online meeting because of COVID-19 reasons. Most informants participated well in this study, although several ignored our interview request. If we needed complementary data that had not been gained during the interview, we contacted the informant via personal chat on WhatsApp. The secondary data were gathered from a government report, official websites,

and online newspapers. The unit analysis of this study was a government programme because we specifically analysed the Green Siak programme, continuously practiced by the government of the Siak regency. The data were analysed using open coding and thematic analysis. One researcher carried out the coding and checked by another to ensure accuracy. Lastly, the proposed analytical results relied on specific themes and were descriptively explained.

3. Results and Discussion

In this section, we shed light on the background and rationale of Green Siak, the multiple actors involved, and the activities in the programme. The purpose of this section is to provide an explanation to fulfill the research objectives mentioned in the introduction.

3.1 Green Siak Programme in Siak Regency

Siak is the regency promoting sustainable preservation by harnessing natural resources for economic purposes. Siak has 57.44% peatland area from the total site, 8,556.09 km², becoming a competitive advantage. It means almost all districts in Siak are located in the peatland area, except Lubuk Dalam and Kerinci Kanan. Despite its benefits, Siak is also vulnerable to forest fires. In addition, the switch function of peatland being various property seriously endangers Siak. The threats can accelerate the enhancement of the earth's temperature, generating climate change and a variety of natural disasters. Therefore, the existence of peatlands and green area have become a critical point in preserving climate stability in Siak and Indonesia in general [15].

To address global warming and climate change, Siak established Green Siak in 2016. Green Siak is the programme initiated by the government of Siak regency to enforce conversion and sustainable development in utilising natural resources for economic objectives. The principles ensure the management and utilization of natural resources by considering diverse interests, such as ecological, economic, and social responsibilities. Furthermore, the objectives of Green Siak can be described as follows [16]:

1. Reducing natural resources damage, especially peatland and watershed
2. Creating economic growth in accordance with sustainable development
3. Utilising natural resources by considering environmental preservation and sustainability
4. Making a policy combining conservational activity and economic growth
5. Addressing poverty through popular economic empowerment, manpower, and population control

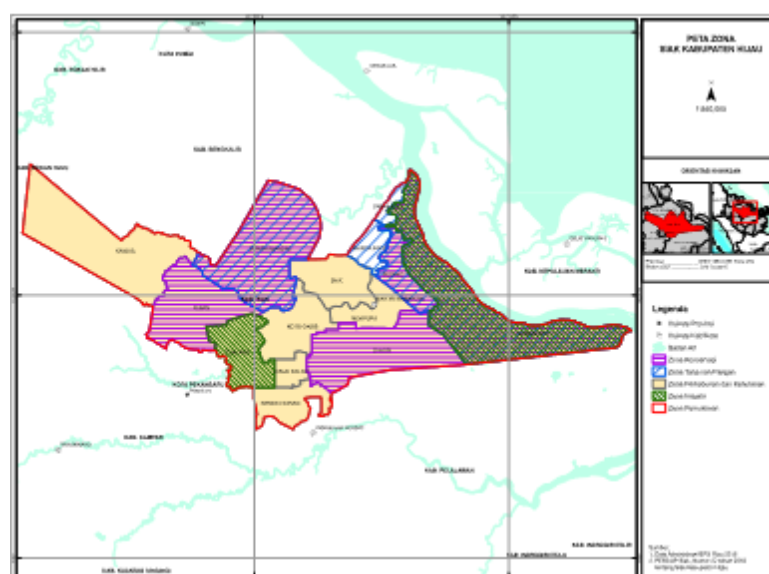


Figure 1. The Zone of Green Area in Siak Regency
Source: Roadmap of Green Siak Regency [16]

The government of Siak regency divides its area relied on specific zones. According to the regulation of Siak regent No. 22 of 2018, Siak as a green regency is divided into five zones: conservational, crops, forestry and plantation, industrial, and housing. Figure 1. illustrates zoning distribution and green area in the Siak regency.

3.2 Actors

After its release, many civil society organisations (CSOs) from various places took part in the Green Siak. A total of 20 CSOs, all of them environmental CSO, are involved in participating in multiple activities of Green Siak. To coordinate these CSOs, they declared "Sedagho Siak" or the Siak friends forum, in September 2017 [17]. It is an alliance in implementing Green Siak [18]. The names and origins of the CSO in *Sedagho* Siak are depicted in Table 1. The platform aims to coordinate, facilitate, assist, and implement CSOs' activities in supporting the mission of Siak as a green regency.

Table 1. The Members of *Sedagho* Siak

| Origins | Civil Society Organization |
|----------------|--|
| Regency | TERAS Riau, SENDS, Yayasan Ekosistem Zamrud (YEZ) |
| Province | Perkumpulan Elang, Jaringan Masyarakat Gambut Riau (JMGR), Yayasan Mitra Insani, Kaliptra Andalas, Jikalahari, RRWG, Walhi Riau, Fitra Riau |
| National level | Lingkar Temu Kabupaten Lestari (LTKL), WRI Indonesia, Winrock International, Madani, CSF Indonesia, Eco Nusantara, Rainforest Alliance, Greenpeace Indonesia, Caoction Indonesia, Serikat Petani Kelapa Sawit (SPKS) |

Source: www.siakhijau.or.id

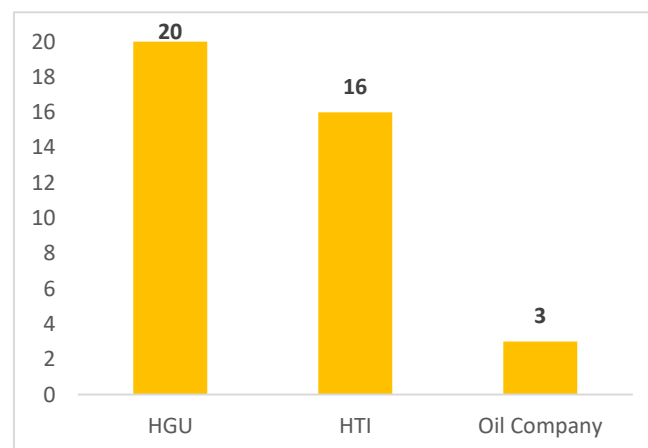


Figure 2. The Number of Private Sector Receiving the Right of Exploitation in Siak Regency

Besides CSO activists, corporations should commit to boosting Green Siak's objectives. Based on the data of the Government of Siak Regency in Figure 2, there are 39 corporations operated in Siak. Of the total corporation, 20 corporations have the right of exploitation (*Hak Guna Usaha* or HGU), followed by 16 corporations managing industrial forests (*Hutan Tanaman Industri* or HTI) and three oil companies. Of these companies, there are merely two public companies, such as PTPN V and Pertamina. *Sedagho* Siak provided input on initiatives to support Green Siak, establishing trust [19] with a mutual agreement for the private sector's commitment to supporting Green Siak. Furthermore, it reinforces the Coordination and Evaluation Meeting of Members of

the Private Sector Coalition for Green Siak (KPSSH) secretariat by all stakeholders. This forum aims to design strategies for implementing Green Siak together [20].

Because businesses fully support the Green Siak program in Siak Regency, KPSSH was founded to facilitate coordination. Companies in Siak Regency fully support the Green Siak program, so to facilitate coordination, KPSSH was formed. In this activity, PT Riau Andalan Pulp and Paper (APRIL Group) elaborated on APRIL's Vision 2030 in three primary pledges. First, they would like to establish a favourable environment by applying science-based strategies to reduce carbon emissions dramatically. Second, they committed to a production-protection strategy for landscape management that involves the evolution of the landscape through conservation initiatives. Thirdly, they developed inclusive development by strengthening the community through transformative programs and continuous expansion. Several actions, such as expanding business through diversification, diffusion, and ecological sustainability, contribute to its realisation. The synchronization of APRIL's 2030 strategy with the Green Siak Programme's accomplishments is the company's commitment to supporting Green Siak. [20].

3.3 Activities and Output

The government and its alliances have conducted various activities to reach the vision and mission of Green Siak. It includes diverse programmes related to climate change, environmental and natural resources quality improvement, and environmental governance. The ultimate goal of the activities is to evoke awareness and public attitudes toward preserving the ecological environment. We found three activities conducted by multiple actors in the Green Siak framework. First, the government established a Task Force for Agrarian Reform (*Gugus Tugas Reforma Agraria*, GTRA), land distribution of Land as an Object for Agrarian Reform (*Tanah Objek Reforma Agraria*, TORA) for the society, management, and protection of peatland environment-friendly, training of the best practice of people palm oil plantation, and making green open space, etc. (Figure 3).

Second, coordination among stakeholders has initiated community forestry to address the fire forest issue. Community forestry refers to the use of the forest for economic purpose by recognizing environmental preservation and sustainability [4], [21]. It succeeds in reducing forest fires by 160 percent from 2015 to 2018. In comparison, based on the data of BPBD or firefighter fired area during 2018 is 261 hectares while 2,189.5 hectares during 2018 [16]. Along with the reduction of forest fires, air pollution also decreased.



Figure 3. The Map of Green Open Space (RTH) in Siak Regency
Source: The Government of Siak Regency [22]

Third, the financial transfer policy based on ecology (TAKE) was introduced by the government of the Siak regency. It is a fiscal incentive to the green village, a village applying perpetual environmental sustainability principles by incorporating environmental cost in village finance. It refers to the Regulation of the Siak Regent No. 22 of 2018 and Government Regulation No. 46 of 2017 on the instrument of environmental economics. The government should assess the village gaining TAKE using environmental protection and economic improvement. Environmental protection indicators include regulation, financial allocation, institutional design, innovation, and development. Economic improvement has several indicators: regulation, finance, poverty alleviation, and innovation. On the government side, TAKE is also a tool to control financial transfers to the villages with an initiative to adopt sustainable development.

3.4 Discussion

The present study discusses local initiatives for climate change reduction programme by studying the Green Siak case. We found that the local government has encouraged the initiatives and involved the participation of civil society in the programme. The programme is proposed in a roadmap as a guide. At least 20 CSOs have joined the programme. The government of Siak regency and CSOs collaborate to implement several activities in reaching Green Siak's goals. The activities include peatland protection, community forestry, and green village. As a result, it positively impacts environmental conservation, reducing climate change and global warming risks in the long term [23], [24]. Although several activities have been conducted by joining participation between the government and CSO, the private sectors have not yet shown a willingness to participate in the programme. Therefore, it affects the program's implementation in forest areas exploited by the corporations where the programme cannot be conducted.

The process involving the government of Siak regency and multiple stakeholders in Green Siak in the current literature is acknowledged as collaborative governance. Collaborative governance is the partnership between state and non-state actors in implementing and continuously checking such policies or programmes [25], [26]. Green Siak has shown a feature of collaborative governance, despite poor involvement from the private sector. The collaborative model in Green Siak has obviously seen the activities' actors, process, commitment, and impact on the environment and ecology. In this study, we propose a collaborative model among stakeholders in the Green Siak, as illustrated in Figure 4.

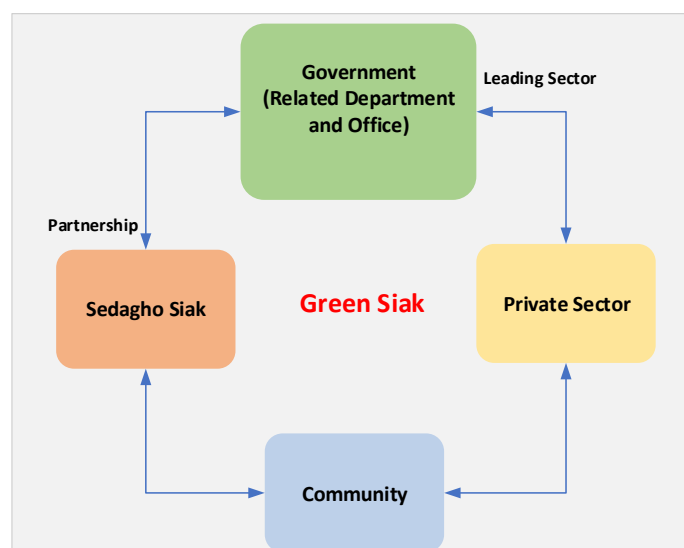


Figure 4. Collaboration among Multiple Actors

The results of this study noted that the government has a crucial role in encouraging climate change reduction programme at the local level. It is in line with the findings of Reckien et al. [7] in their research on 85 cities. Reckien et al. studied the role of cities in Europe in reducing

greenhouse gas emissions as an impact of the Paris agreement. They found that several countries, such as Denmark, France, Slovakia, and the United Kingdom, have climate legislation, mitigation plans, and local adaptation. However, other countries do not yet. The results also confirm Mees et al. study in the Netherlands [6]. Mees et al. analysed the local government's role in adaptation action in the Netherlands. They revealed that the local government has numerous roles in climate change reduction, namely stimulating, networking, and facilitating. Likewise, our analysis notes that non-state actors significantly contribute to reducing the climate change effect. The findings confirm prior research highlighting the contribution of civil society and the government in climate change governance [10], [27]. More recently, Cotler et al. [28] sought the role of civil society organisations in an urban area in Mexico. They revealed that CSOs established new institutions to increase organizational decision-making and facilitate public engagement. In addition, payment for environmental services initiatives encouraged the participation of communities and residents in the protection of downstream environmental remediation. Our results are similar to Cotler et al. but only diverge with the focus. While Cotler et al. focused on watershed management, we considered climate change risk reduction.

The present study contributes not only to the current literature on climate change risk reduction but also to the practice of climate change governance. The results enrich our knowledge of the collaboration among multiple stakeholders [29] in initiating and executing a global warming risk reduction programme in developing countries. Unlike prior research that highlighted an imbalance between state and non-state actors in the programme, our findings note equal roles among the multiple actors. Although the government is an initiator and executor, the programme cannot be well implemented without a whole of non-government participation [30], [31]. Our analysis also contributes to the practice of climate change reduction policy, especially in terms of the involvement of the private sector. Results revealed that there is willingness from corporations in the programme. Therefore, the government should reinforce them by associating the involvement of the corporations with their permit to harness land and forest [32].

4. Conclusion

This paper elucidates the role of state and non-state actors in implementing the programme for reducing global warming and climate change impact. Using a case study of Green Siak, our findings revealed that the local government and multiple civil society organizations are actively involved in climate change reduction activities. Additionally, the programme is also supported by the private sector. This study contributes to the research stream of climate change risk reduction by spotlighting the collaboration between government and non-government organisations. The results also become an essential recommendation to the government in the optimisation of the programme by enforcing the involvement of multiple stakeholders. Despite the promising contribution of this study to theory and practice, the limitation of this study must be conveyed. This study only focused on one developing country, Indonesia, so the results cannot be generalised to other developing countries. Thus, future research can examine other developing countries and compare them to boost or criticise our results.

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References

- [1] Binet S *et al.*, 2020 Global warming and acid atmospheric deposition impacts on carbonate dissolution and CO₂ fluxes in French karst hydrosystems: Evidence from hydrochemical monitoring in recent decades *Geochim. Cosmochim. Acta* **270** p. 184–200.
- [2] Depledge J, 2022 The “top-down” Kyoto Protocol? Exploring caricature and misrepresentation in literature on global climate change governance *Int. Environ. Agreements Polit. Law Econ.*
- [3] Maamoun N, 2019 The Kyoto protocol: Empirical evidence of a hidden success *J.*

- Environ. Econ. Manage.* **95** p. 227–256.
- [4] Sulistiowati R Wahyuni S Yunanto M K Elsera M Yudiatmaja W E and Samnuzulsari T, 2022 Community forestry for environmental sustainability and ecotourism: the context and problems in Indonesia *IOP Conf. Ser. Earth Environ. Sci.* **1041**, 1 p. 012037.
 - [5] Kabullah M I, 2022 The innovation of ecological fiscal transfers policy at Siak Regency *IOP Conf. Ser. Earth Environ. Sci.* **1041**, 1 p. 012040.
 - [6] Mees H L P Uittenbroek C J Hegger D L T and Driessen P P J, 2019 From citizen participation to government participation: An exploration of the roles of local governments in community initiatives for climate change adaptation in the Netherlands *Environ. Policy Gov.* **29**, 3 p. 198–208.
 - [7] Reckien D *et al.*, 2018 How are cities planning to respond to climate change? Assessment of local climate plans from 885 cities in the EU-28 *J. Clean. Prod.* **191** p. 207–219.
 - [8] Vukmirovic M Gavrilovic S and Stojanovic D, 2019 The improvement of the comfort of public spaces as a local initiative in coping with climate change *Sustainability* **11** p. 6546.
 - [9] Nofiyanti F Pradhipta R M W A Gantina D Rianto R and Yudiatmaja W E, 2021 Tourism attraction and CBT of agro tourism in Cafe Sawah Pujon Kidul *E3S Web Conf.* **316** p. 04001.
 - [10] Landholm D M Holsten A Martellozzo F Reusser D E and Kropp J P, 2019 Climate change mitigation potential of community-based initiatives in Europe *Reg. Environ. Chang.* **19**, 4 p. 927–938.
 - [11] Adenle A A *et al.*, 2017 Managing climate change risks in Africa - A global perspective *Ecol. Econ.* **141** p. 190–201.
 - [12] Kristanti D *et al.*, 2021 Strengthening social capital of urban community during COVID-19 disaster *E3S Web Conf.* **331** p. 01013.
 - [13] Haris S M Mustafa F B and Raja Ariffin R N, 2020 Systematic literature review of climate change governance activities of environmental nongovernmental organizations in Southeast Asia *Environ. Manage.* **66**, 5 p. 816–825.
 - [14] Yin R K, 2018 *Case study research and applications: Design and methods* 6th ed. Sage Publications, Inc.
 - [15] Akbar D Setiawan A Mariani M Adhayanto O Okparizan O and Yudiatmaja W E, 2021 Environmental awareness and concern over transboundary oil spill in Bintan island: A preliminary analysis results *E3S Web Conf.* **324** p. 06003.
 - [16] Sedagho Siak and Government of Siak Regency, 2019 *Roadmap toward Siak green regency: A guide to encourage preservation and sustainability principles in utilising natural resources and enhancement of popular economy*.
 - [17] Samnuzulsari T *et al.*, 2021 The strategic role of civil society organisations in handling climate change: A case of Riau in Indonesia *IOP Conf. Ser. Earth Environ. Sci.* **824**, 1 p. 012104.
 - [18] Kristanti D *et al.*, 2021 Network governance in addressing climate change: a case study of the Asian Cities Climate Change Resilience Network (ACCCRN) in Indonesia *IOP Conf. Ser. Earth Environ. Sci.* **724**, 1 p. 012091.
 - [19] Yudiatmaja W E Solina E Mandala E Yunanto M K Samnuzulsari T and Utari D S, 2022 Citizens' Trust in Smart Governance During COVID-19 Pandemic in *9th International Conference on ICT for Smart Society: Recover Together, Recover Stronger and Smarter Smartization, Governance and Collaboration, ICISS 2022 - Proceeding*.
 - [20] Website Administrator, 2021, Private sector through its sustainability policy activities ready to collaborate to harmony for the success of Siak Hijau. [Online]. Available: <https://econusantara.org/private-sector-through-its-sustainability-policy-activities-ready-to-collaborate-to-harmony-for-the-success-of-siak-hijau/>. [Accessed: 28-Sep-2022].
 - [21] Basnyat B, 2020 Commodifying the community forestry: A case from scientific forestry practices in Western Hills of Nepal *J. For. Res.* **25**, 2 p. 69–75.
 - [22] The Government of Siak Regency, 2021, Executive summary of performance information of environmental governance of Siak regency, Siak, Riau.

- [23] Yudithia Y Edison E Kristanti D Samnuzulsari T Suyito S and Yudiatmaja W E, 2020 Evaluating the Impact of Technological Adoption Policy for Rural Coastal Communities *E3S Web Conf.* **202** p. 1–7.
- [24] Yudiatmaja W E *et al.*, 2021 Social impacts of using a solar panel for rural coastal communities: A case study from Karimun Regency, Kepulauan Riau *E3S Web Conf.* **316** p. 04005.
- [25] Ansell C and Gash A, 2002 Collaborative governance in theory and practice *J. Public Adm. Res. Theory* **12**, 4 p. 543–571.
- [26] Emerson K Nabatchi T and Balogh S, 2012 An integrative framework for collaborative governance *J. Public Adm. Res. Theory* **22**, 1 p. 1–29.
- [27] Mahadiansar M Wijaya A F Wanto A H Yudiatmaja W E and Setiawan R, 2021 Governing sustainable tourism in time of COVID-19 disaster: Empirical evidence from Bintan, Kepulauan Riau *E3S Web Conf.* **331** p. 02002.
- [28] Cotler H Cuevas M L Landa R and Frausto J M, 2022 Environmental governance in urban watersheds: The role of civil society organizations in Mexico *Sustainability* **14**, 2 p. 988.
- [29] Yudiatmaja W E *et al.*, 2022 Adoption of online learning in Indonesian higher education during the COVID-19 pandemic *J. Behav. Sci.* **17**, 2 p. 73–89.
- [30] Nasiritousi N Hjerpe M and Linnér B-O, 2016 The roles of non-state actors in climate change governance: Understanding agency through governance profiles *Int. Environ. Agreements Polit. Law Econ.* **16**, 1 p. 109–126.
- [31] Yudiatmaja W E Yudithia Y Samnuzulsari T and Suyito S, 2020 An institutional analysis of the trans-national marine waste: A case study of sludge oil in Bintan seawater, Kepulauan Riau, Indonesia in *IOP Conference Series: Earth and Environmental Science* **423**, 1.
- [32] Klein J Araos M Karimo A Heikkinen M Ylä-Anttila T and Juhola S, 2018 The role of the private sector and citizens in urban climate change adaptation: Evidence from a global assessment of large cities *Glob. Environ. Chang.* **53** p. 127–136.