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Systematic mapping study of climate change mitigation: a review of public administration studies

Iman Santoso[1*)], Denny Nazaria Rifani[2], Cahyoko E. Tando[3]
[1]*Department of Correctional Techniques, Politeknik Ilmu Pemasyarakatan, Indonesia*
[2]*Department of Correctional Management, Politeknik Ilmu Pemasyarakatan, Indonesia*
[3]*Department of Community Guidance, Politeknik Ilmu Pemasyarakatan, Indonesia*

Abstract

Climate change is a critical issue that is constantly discussed in numerous international forums, particularly considering its wide-impact and cross-sectoral nature. Every aspect of real life, especially the environment, is impacted by this global phenomenon, hence the need for real solutions from various groups. Public administration scientists saw this as a problem that must be solved through several literature studies conducted. This research method will use a systematic mapping study using the Taylor and Francis Group database that has been determined. The results of this study with 3 actors combined with collaborative governance show that government actors focus on domestic and foreign policies adopted by emphasizing the collaboration between government agencies that can be done. Meanwhile, the private sector has a unique contribution where they implement a circular economy and mutual cooperation determined by the principle of humanism and remain humane by helping the community. Meanwhile, community actors emphasize the existence of local knowledge and community capacity as knowledge resources in climate change adaptation. This research shows the interplay among actors in climate change mitigation and encourages future researchers to provide a connection to decision-making. Current trends suggest that the public and private aspects of climate change mitigation currently lack synergy, with each of the key governance actors working separately to mitigate climate change.

Keywords: *collaboration, climate change, mitigation, community actors*

*)corresponding author
E-mail : dennyrifani@poltekip.ac.id

Introduction

Research topics related to climate change are currently a hot issue being discussed by various scientific circles, including those from the United Nations (UN), which always responds to the policies of various countries to continue to pay attention to global climate change which continues to experience degradation and accelerated change. This condition forces various countries to find ways to overcome the problem of climate change, because its impact is very constructive on development and disrupts a country's internal conditions. The massive impact of climate change is certainly very difficult for various parties to predict accurately, including the negative impact on food. One case of the impact of phenomenal climate change in recent years is the decline in several global commodities as an initial impact that can be felt due to climate change. It is recorded that North America, Eastern Europe and East Asia are currently experiencing a decline in yields of up to 7% (Subari, 2023). Referring to reports since the 1950s, rain is the main factor indicating climate change. Through the IPCC (Intergovernanmental

Panel on Climate Change) UN, the current condition of the Earth is very worrying and it is estimated that the temperature will increase by 2,8^{o}C its mean warm situation.

Research by Lamb et al., (2024) discovered the fact that Carbon Dioxide Removal has an agreement of only increasing carbon emissions by 1.5^{o}C. However, the results of his research show that no country in the world currently has a substantial and sustainable commitment to lifting or storing air carbon directly, especially commitments in land use (Zhao et al., 2024). One of the causes of global climate change is Green House Gases (GHG) which are not managed properly by many countries (Abeydeera et al., 2019; Andrian & Kevin, 2021; Liu et al., 2023).

If we refer to the data from the Climate Action Tracker report, China is the first country in the world with the largest contributor to global emissions, where in 2022 it will produce greenhouse emissions of 50 billion metric tons of earth-heating gas, and 14.4 billion metric tons of Green House Gases (GHG). or 30% of total global emissions. Meanwhile, the United States of America is also in second place with 6.39 billion metric tons and India with 3.52 billion metric tons (Alamsyah, 2024; Chen & Liu, 2023). The efforts made by China considering that its country is a country that contributes to global emissions has made the country's government carry out a policy overhaul, namely by Beautiful China Initiative (BCI), which is China's hegemony in many fields and offers Chinese solutions to sustainable global development with support for strong planning, cross-stakeholder coordination and support systems from the BCI (Qin et al., 2024; Xie, 2020).

Meanwhile, Indonesia itself has made various efforts to commit to better governance in environmental management and also governance of regulations that lead to a sustainable environment. Meanwhile, Indonesia's glass gas emissions data in 2020 reached 1,160 million metric tons and placed Indonesia in 7th place in the world (Cahyo et al., 2023; Nursulistyo et al., 2022). It is known that East Kalimantan Province is the only province in Indonesia that received an award for its commitment to reducing carbon within the REDD+ framework and the FCPF Program where 30 million tons of CO^2 equivalent were successfully reduced and while the assessment from the World Bank was at a standard of 22 million tons of CO^2 equivalent (MMR Portal, 2023). The reward for this achievement is in the form of incentives given to the East Kalimantan Provincial Government to prioritize the environment and sustainable development that is adaptive to climate change in the future. Meanwhile, nationally, Indonesia is the country with the largest grant recipient in the world for environmental management for the next 4 years, by the Multilateral Global Environment Facility amounting to 100 million dollars. This grant fund is much larger than that of China, India, and even Brazil (Pritama, 2022).

Indonesia's commitment to handling climate change is currently still being handled by the Ministry of Environment and Forestry. If referring to Law Number 16 of 2016 concerning Ratification of the Paris Agreement only accommodate the ratification of the Paris Agreement, then to Presidential Regulation Number 98 of 2021 concerning Implementation of the Economic Value of Carbon to Achieve Nationally Determined Contribution Targets and Control of Greenhouse Gas Emissions in National Development in article 3 paragraph 1 which clearly provides a climate resilience baseline that the NDC (nationally determined contribution) target until 2030 for GHG emissions is 2,869 million tonnes of CO^2e. paragraph 2 for a GHG reduction of 29% or around 834 million tons of CO^2e if done by one's own efforts. Meanwhile, in paragraph 3, the commitment is 41% or the equivalent of 1,185 million tons of CO^2e if international cooperation is carried out.

However, if you look at these two regulations, they only strengthen the forestry sector while other factors are still minimal. If you look at the report Institute for Essential Services Reform in 2021 stated that the use of fossil energy reached 82% as a contributor to GHG in Indonesia. then the use of motorized vehicles, electricity use, industrial waste, livestock waste, and even household food waste are the causes of this GHG. When referring to the 2020-2024 National Medium-Term Development Plan, improving the quality of life, disaster resilience and climate change as well as low carbon development is currently the main focus of the Indonesian Government with a 2021 budget of 112.7 trillion or an increase of 55.71% compared to 2020 (Purwowidhu, 2023).

Several previous studies, including those by Hardoy & Pandiella (2009) had an impact on poverty due to climate change. Mulyani & Jepson (2013) which highlights REDD+ in Indonesia but has not shown significant results. Elliott & Setyowati (2020) reduce the impact of climate change by restoring the forestry sector. Cahyo et al., (2023) CO^2 reduction by prioritizing alternative and renewable energy. Jakob (2022) who conducted research on the negative impacts of climate change and the agricultural sector as well as reducing carbon emissions internationally. Daly et al., (2023) strengthening indigenous communities to mitigate climate change and social capital from the community

Therefore, there is a need for mapping on the policy side to pay more attention to other sectors as contributors to GHG in Indonesia, not only on the forestry side which has so far focused on this sector but other sectors also need to be paid attention to by various parties. Researchers will carry out a mapping study related to this matter. With a review of public administration, the mapping will focus on mitigation studies which are expected to be implemented in Indonesia as an answer to climate change that is hitting Indonesia. This mapping study is one way to answer various challenges and experiences from previous research which emphasizes the results of field research. It is hoped that the adoption of the research results will be useful for stakeholders in Indonesia and will be able to provide mitigation of climate change.

Apart from that, one of the studies by Godden, Wijekoon, & Wrigley (2022) prioritizing an agricultural sector approach and strengthening farmers in facing climate change. Based on several previous studies, this research is of course directed at mitigation using the SMS method and strengthening climate change using a public administration perspective. This research is considered a novelty because several previous studies had minimal access to public administration approaches.

The research question is how the systematic mapping study of climate change mitigation can be applied in Indonesia. This mapping does not only target contributions from the government alone. However, it will involve 3 stakeholder elements, where public administration studies with a collaborative governance perspective must involve government, society and the private sector regarding the problems faced. The use of a collaborative governance approach is also an answer to societal solutions that must be addressed together with the collaboration of these three elements. Where these three elements also have a role in contributing to GHG and causing climate change and even their impact on all of society itself.

Research Methods

The research will use Systematic Mapping Study (SMS) which emphasizes secondary research (See Figure 1). This research is research that describes the types of synthesis activities in the article. Used to explain and detail research at a high level and

map research based on research questions, in other words this method is considered capable of getting a general picture of the research area or topic which produces a variety of detailed information (Brereton et al., 2007; Kitchenham et al., 2009).

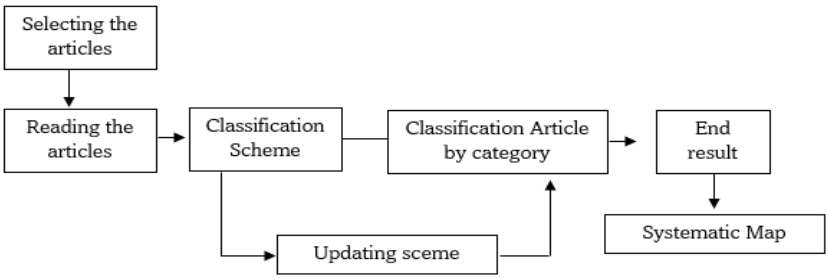

Figure 1. Systematic Mapping Study Method
Source: processed data (2024)

To get accurate results using the Systematic Mapping Study method, this process will produce several findings in the form of scientific articles in the form of journals. The strategy is carried out by searching and determining exclusion criteria adopted from Petersen et al., (2008). The article search will emphasize the use of databases as valid data sources, namely the Taylor and Francis Group database which is the international database with the best reputation to date. The use of the Taylor and Francis Group database is based on research van Wee & Banister (2023) What differentiates a database is that it must have in-depth analysis and have complete features in the literature review method. Meanwhile, the use of other databases does not have complete features, for example Google Scholar and Scopus are limited and the Taylor and Francis Group indexation of course refers to Scopus.

Meanwhile, the search steps will refer to the strategy implemented by Barbosa & Alves (2014) where the first step is to determine keywords, namely **"Mitigation"** and **"Climate Change"**, then check the research themes found to answer this research question, third is alternative keywords which are a combination of both and fourth is Boolean with synthesis being one of the search strings.

Below are the data sources that will be used as a reference in this research:

Table 1. Research Results

No	Databases	Keywords	Elimination	Relevant
1	Database Taylor and Francis Group	91,040	109	25

Source: processed data (2024)

For article selection criteria, several reference standards will be used which can be obtained by referring to Petersen et al., (2008) including the following, namely elimination of articles that were not published in the 2019-2023 period (5 years), elimination of articles that do not discuss mitigation and climate change as the focus of research, elimination of articles that do not come from field research results, elimination of articles in the form of scientific proceedings, book reviews, book chapters, and policy briefs. Eliminate articles that do not use English, eliminate articles that do not use a social science scope, and eliminate articles that are not open access.

Classification of articles is carried out with reference to Jorgensen & Shepperd (2007). This is done by considering several elements in the article that explicitly explain the object of study. Analysis and classification of articles can be selected based on criteria, researchers are expected to be able to develop a classification scheme structure with references Petersen et al., (2008). Meanwhile, in this study researchers used three categories in classifying articles. Among them are categories carried out on the basis of

research methods which must be field research, then research location, as well as research focus which studies according to research themes and keywords.

Results and Discussion

The research results obtained using the SMS method showed 91,040 results with various types of articles and methods obtained. To provide a clearer and relevant picture in answering the research question, further details will be provided. The results of this research were carried out by synthesizing all the articles found. The result was 25 articles from various journals that had been indexed and had a reliable reputation. Narrowing the scope of the SMS method will make it very easy for researchers to carry out evaluations and conduct more comprehensive studies to answer research question.

The results showed that at least 91,040 articles were found, then filtering was carried out to provide the right focus and obtained 109 articles. Another finding the researcher added was by focusing more on social science and also emphasizing themes that can be used in answering the research question, and the researcher used journals namely cogent social science and environmental sociology where the majority of the themes chosen by the researcher were spread in this journal, especially those It is also related to the involvement of the three actors or one actor in collaborative governance. The final result of the number of articles used was 25 journals. After finding relevant articles to answer the research question, the researcher then carried out a detailed synthesis by emphasizing the 3 main things that must be stated, including research methods, research location and research theme (see table 2).

Table 2. Synthesis of Research Results

Actor	Research area	Method	Authors
Government	Urban green infrastructure	visualisasi method	(Court et al., 2022),
	Climate-based carbon interventions	quantitative	(Ofoegbu & Ifejika Speranza, 2021)
	Urban governance policy	etnography	(Westskog et al., 2022)
	Economic and political stability	qualitative	(Macheka, 2021)
	Climate change and climate policy	qualitative	(Godden et al., 2022)
	Local government intervention on climate change	qualitative	(Atanga, 2023)
	Flood management Policy	qualitative	(Setiadi et al., 2023)
	Cross-sectoral climate change policy	qualitative	(Matti et al., 2021)
	Circular carbon economy Approach	qualitative	(Shehri et al., 2023)
	Reconceptualizing flood management	qualitative	(Zimmermann et al., 2023)
	Biodiversity convention	qualitative	(Botchway, 2021)
	Cross-government strengthening	qualitative	(Khatri et al., 2022)
Civil	Local community involvement	Mix Method	(Gabriel et al., 2020)
	Adaptation of local farmers	quantitative	(Sriartha et al., 2023)
	Indigenous communities and the Green Climate Fund	qualitative	(Bertilsson & Soneryd, 2023)
	Smart climate agriculture	qualitative	(Phiri et al., 2021),
	Local knowledge to increase	quantitative	(Tene, 2022)

	productivity		
	Adaptive agriculture	quantitative	(Quang et al., 2023)
	Climate change adaptation with rapid response in rural areas	quantitative	(Yamba et al., 2019)
	Adaptation to climate	quantitative	(Karki et al., 2020)
	Education for society	qualitative	(Dlamini, 2020)
	Adaptation of urban marginal farmers	qualitative	(Dube et al., 2021)
	Agricultural mutualism symbiosis	qualitative	(Li & von Essen, 2021)
Private	Hotel food waste management	qualitative	(Demetriou, 2022)
	Food waste management	qualitative	(Abrahamsson, 2023)

Source: processed data (2024)

Based on the synthesis results above, at least several interrelated patterns can be seen in the keywords "**Mitigation**" and "**Climate Change**", then from the in-depth research the researchers divided each article into several sub-collaborative governance which has 3 main elements, namely government, private sector and society. Each sector describes its contribution from the keywords that have been determined. The following is the explanation below:

The Government's role in mitigating climate change

Using collaborative governance in this study is very relevant when applied to public administration, specifically government actors are dominant because of all roles, the government becomes a very interested stakeholder (Ulibarri & Scott, 2016). Based on the research results, at least 12 articles from various countries were found that discussed the government's contribution to climate mitigation and change. The policies taken certainly cannot conflict with international policies, for example the Paris Agreement which requires a mutual agreement between each country to reduce its gas emissions.

Globally, the results of the G-20 Presidency in 2023 have begun to lead to a circular carbon economy that can be run sustainably (Shehri et al., 2023). This option means that high-income countries with manufacturing industries as the main economic support must work to reduce air pollution and dependence on fossil raw materials obtained from natural resource-producing countries. On the other hand, this commitment continues to emerge through the IPCC (the Intergovernmental Panel on Climate Change) and UNFCCC (United Nations Framework Convention on Climate Change) regulations as the UN framework for climate change adaptation with classification of time, objectives and motives for implementation (IPCC, 2007; UNFCCC, 2006).

However, referring to Atanga (2023) The government's implementation of climate change has been very slow because many local capacities are still marginalized. So, quite a bit, the government's actions have resulted in climate change mitigation not being implemented optimally. This problem can also be caused by economic and political problems in an unstable country, something similar happened in Zimbabwe where the environmental degradation crisis became an urgent matter in that country (Macheka, 2021). Meanwhile in Indonesia currently, research results for climate change adaptation still refer to Law Number 16 of 2016 concerning Ratification of the Paris Agreement has not shown maximum progress.

Meanwhile, comparisons in the UK for green agenda priorities are already on the agenda with the UK government's commitment to allocate a budget of 40 million Euros with an estimated time of 25 years including preparation of long-term environmental policy plans (Court et al., 2022). For Indonesia, for example, the flood policy in Bandung City, West Java Province already exists but is still hampered in its achievement, where control of public awareness is still low, land conversion and illegal buildings are out of place (Setiadi et al., 2023). In fact, the impact if this program fails is that it will result in economic losses and social impacts, even though flood control should be a proactive step in adapting to climate change (Auerswald et al., 2019; Manzoor et al., 2022).

Of course, cross-sectoral policies must be pursued by the Indonesian Government, this has also been done by the Swedish Government, where as a country that is a pioneer in climate change and advancing mitigation, this country has adopted climate change regulations since 2017 and emphasizes the existence of cross-sectoral and policy experts in the context of climate change. in prioritizing this climate issue (Matti et al., 2021). Indonesia through the Ministry of Forestry and Environment through the Directorate General of Climate Change Control is trying to deal with climate change only focusing on the forestry sector and its problems, for example forest and land fires. Meanwhile, for climate change control instruments, currently there are still no significant returns (Lestari, 2019; Siswoko, 2008). On the other hand, there is a standard reference for implementing National Action Plan for Climate Change where the implementers are across governments in Indonesia (see table 3).

Through this National Action Plan for Climate Change, the Indonesian Government will have a reference in conducting comparative studies of several literature results. This means that Indonesia just needs to implement it with measurable coordination with various Ministries who are united in fighting climate change which has become a main issue in various countries including Indonesia with sub-problems that are integrated into the work program of each Ministry. If referring to Godden et al., (2022) that the issue of extreme climate change in several countries is an issue that not only has an impact on vital sectors, but also on issues of social justice in society. Full policies must be created in such a way as to prevent and mitigate internal and external risks.

Indonesia has several times implemented a dual combination of policies, both domestic policies and international policies, some of which have been adopted, then several local concepts that are often used have been implemented to prevent widespread climate change.

Table 3. Stakeholders in RAN PI

Field	Sub-Field	Responsible
Economic resilience	1. Food security 2. Energy independence	Indonesian Institute of Science, National Land Agency, Ministry of Environment and Forestry, Ministry of Public Development and Public Housing, National Planning Management Agency, National Planning Agency, Central Statistics Agency, Agency for the Assessment and Application of Technology, Ministry of Energy and Mineral Resources, Meteorology and Geophysical Climatology Agency, Ministry of Education, Ministry of Finance

Life system resilience	1. Health 2. Settlement 3. Infrastructure	Ministry of health, Ministry of Public Development and Public Housing, Ministry of Home Affairs, National Board for Disaster Management, Coordinating ministry for people's welfare, Ministry of Maritime Affairs and Fisheries, Indonesian Institute of Science, Ministry of Energy and Mineral Resources, Ministry of Environment and Forestry, Agency for meteorology, climatology and geophysics, Technology Assessment and Application Agency and Ministry of Maritime Affairs and Fisheries
Ecosystem resilience	ecosystem and biodiversity	Ministry of Environment and Forestry, Agency for meteorology, climatology and geophysics, Technology Assessment and Application Agency, National Planning Agency, Ministry of Public Development and Public Housing, Ministry of Maritime Affairs and Fisheries, Indonesian Institute of Science, National Board for Disaster Management, Ministry of Women's Empowerment and Child Protection, Ministry of Home Affairs, and Ministry of agriculture
Special region resilience	1. Urban 2. Coast and small islands	Ministry of Public Development and Public Housing, Ministry of Home Affairs, National Planning Agency, National Board for Disaster Management, Ministry of Public Development and Public Housing, Ministry of agriculture, Ministry of Education and Geospatial Information Agency.
Support system	1. Increasing capacity for stakeholders in climate change adaptation 2. Development of reliable and up-to-date climate information. 3. Increasing research and development of science and technology related to climate change adaptation 4. Planning and budgeting that can respond to climate change 5. Monitoring and evaluating climate change adaptation activities	National Planning Agency, coordinating ministry and people's welfare, Ministry of Foreign Affairs, Indonesian Institute of Science, National Board for Disaster Management, National Planning Agency, Ministry of law and human right, Geospatial Information Agency, and Ministry of Environment and Forestry.

Source: Fiscal Policy Board (2018)

Some of the policies that are starting to be implemented are urban governance policies that must provide as much green open space as possible and the minimum is 30% which is certainly a very good thing, because not all areas have to be buildings or commercial land (Ofoegbu & Ifejika Speranza, 2021; Westskog et al., 2022). Meanwhile,

the existence of protected forest zones and biological breeding efforts must be an important concern for Indonesia so that this area becomes a support for natural oxygen and also natural mitigation and even as natural vegetation to prevent global climate change (Botchway, 2021). Indonesia must continue to make various efforts including cross-sectoral strengthening and making this a main strategic issue alongside other issues, because the impact is massive and has evolved into things that are very detrimental to many parties, including humans (Khatri et al., 2022).

Zimmermann et al., (2023) stated in his research that the failure in mitigation by the government in India was only due to indications of centralized policies. Meanwhile, if we compare it with Indonesia, which fully implements centralized policies, this could be the reason why climate change does not have much significance in Indonesia. As a result, there must be a role for local government to support all Central government activities, while adoption in Indonesia is regional autonomy (Sahabuddin et al., 2019). Of course, it can be the basis for implementing climate change mitigation without having to issue new policies, all of which are stated in the regulations on regional government.

Community contribution to global climate change

In the review of public administration, especially collaborative governance, the community plays a very big role, especially the community which is the subject of the impact, but on the other hand, the community is also the owner of local resources and local knowledge which is always developing without eliminating the elements of local governance (Angarita-baéz et al., 2017; Sudiar et al., 2023). In the article search results, the position of society is as an actor who is able to adapt to climate change and has a different pattern of understanding and without adequate policy elements. For example, in Vietnam's agricultural patterns, they carry out adaptive farming to climate change. Farmers in An Giang Province, Vietnam originally carried out agricultural practices, especially rice farming, using various kinds of fertilizers and farming which led to environmental damage and potentially released carbon. However, they have now switched to using environmentally friendly media and are able to make the region remain rich in rice commodities and the largest rice contributor in Vietnam (Quang et al., 2023).

Meanwhile in Cameroon, the majority of people consume processed products from the Sorghum plant (a type of wheat) where cultivation is carried out in communities in the Semi-Arid Zone and the method used is to implement an obligation on local communities to plant independently on their land and support whatever local knowledge the community has. which can make Sorghum develop and become local production to overcome climate change. The result was a much higher 21.9% Sorghum yield produced from this system (Tene, 2022). Meanwhile, if we refer to the involvement of local communities, what has been discussed so far is limited to adaptation and use of organic materials to meet their daily needs, or the absence of use of chemical fertilizers and the frequent reliance on conventional labor and compliance with applicable customary laws (Gabriel et al., 2020; Karki et al., 2020).

Indonesia with local communities and still maintaining local values applies the same thing, for example in Bali, the Badung region where farmers carry out farming using the Subak method, namely farming with a terraced system, or downhill and is usually done in hilly and downhill farming areas so it is necessary perfect irrigation mechanisms and mutual cooperation will preserve nature, this traditional method has succeeded in making this area a rice granary in the Rice region and is able to meet the

internal needs of the community and region and some of the results are able to supply other regions (Sriartha et al., 2023). This process is a very unique and interesting process to develop as an agricultural pattern that prioritizes the process of uniting with nature and is able to produce something different but is still able to maintain local wisdom (Phiri et al., 2021).

Adaptation to climate change will very quickly target vulnerable areas, especially communities and the environment (Yamba et al., 2019). Society with its complexity is always underdog in various ways. However, with local knowledge passed down from generation to generation, this can be overcome quickly (Bertilsson & Soneryd, 2023). Education for the community certainly cannot be taken for granted and must be encouraged. According to Dlamini (2020) It is very important for education to be given to society, especially marginalized communities who are often affected (Dube et al., 2021), left behind or even underdeveloped, they are not only considered as ring elements that are directly related to climate change but they are also important elements in the perspective of collaborative governance.

Balancing society as part of climate change adaptation and the access that can be given and obtained by them can make society the party that benefits and is able to adapt amidst an extreme changing environment. This kind of symbiosis provides the view that society is no longer positioned as policy recipients or as victims of climate change. They are parties who contribute with various experiences and local knowledge and are able to provide great benefits to their communities or to other sectors which are currently struggling with various ways in mitigation (Li & von Essen, 2021).

The private sector and climate change

In the theory of collaborative governance, the private sector is always presented with various advantages and also large sources of capital. This is natural in every collaborative activity to be an actor who is taken into account both in terms of resources, technology, finance, experience, etc., not all of which are capable of existing in other actors, both government and society (Bajwa et al., 2018; Huxham et al., 2000). The private sector in the initial review of the reference collaborative governance theory Ansell & Gash (2017) Initially, the role of government was that the government itself was unable to address the various problems that existed in society. Meanwhile, to respond to rapid changes and adapt to all problems, organizations are needed that handle a variety of problems (Holmqvist & Pessi, 2006).

The problem of climate change will be very easy if it is handled by the private sector because it has full resources. Meanwhile, if you look at the contribution to climate change, it is also done by the private sector. The private sector is an element that always prioritizes profits because it does not receive financial support from the government and hopes that there will always be mutualism. The results of the research show that the circular economy is currently considered as a solution offered to the government and the private sector is able to implement circulation like this as an answer to climate change while still prioritizing sustainable economic principles. One of them is in Sweden where research by Abrahamsson (2023) that food waste management is one of the contributors to the impact of climate change and the release of carbon gas, in addition to heavy economic sector activities such as industry, mining and transportation services as contributors to carbon gas. Waste management from the role of tourism is something that is currently developing rapidly and there are several countries that only rely on this economy even though the majority are in Europe. These countries rely heavily on the tourism sector due to the lack of natural resources. This is

different from countries in the Asian region, the majority of which still rely on natural products and the enormous contribution of natural resources to support their national economy (Shittu et al, 2021; Zhou et al., 2020).

Circular economy is a concept that is also applied in Cyprus, where hotel managers who contribute to the country's economy always make integrated waste management efforts with waste disposal centers in the country. Research by Demetriou (2022) in the City of Limassol, Cyprus shows good waste management and prioritizes the principles of thrift and coordination with hotel management from all over the city and collects it to give to the city's hungry residents.

Conclusion

Conclusion in this research is that government actors in collaborative governance circles have focused on adopted domestic and foreign policies by emphasizing collaboration across government institutions that can be carried out by all parties in carrying out disaster response and post-disaster activities. Based on the results of a comprehensive analysis, researchers found various articles stating the actions that must be taken by the Government in mitigating Climate Change. Apart from that, through RAN PI, at least we already have a strong foundation for carrying out mitigation across ministries. Including sub-problems which are divided according to the contribution of each Ministry.

Meanwhile, community actors emphasize the existence of local knowledge and community capacity as knowledge resources in climate change adaptation that can be adapted and applied in several places. Communities have a big contribution to this mitigation because they are the subjects who directly deal with problems in the field and those who are affected by climate change. Through various local capabilities and local wisdom, of course it must be directed to achieve a level of mitigation that is closely related to the problem of climate change. And the last, the private sector has a unique contribution in that they implement a circular economy and mutual cooperation which is determined by the principles of humanism and remaining humane by helping society, so that it is able to develop and continuously adapt to climate changes that occur. The Private Sector has a big role in this mitigation because it has large resources to help make this mitigation a success. On the other hand, the large contribution from the private sector will certainly have a big influence on economic potential which will no longer lead to a conventional economy but towards a more sustainable circular economy.

References

Abeydeera, L. H. U. W., Mesthrige, J. W., & Samarasinghalage, T. I. (2019). Global research on carbon emissions: A scientometric review. *Sustainability*, *11*(14), 1–25. https://doi.org/10.3390/su11143972

Abrahamsson, S. (2023). A defense of waste: the case of municipal food recycling in Sweden. *Environmental Sociology*, *9*(1), 107–116. https://doi.org/10.1080/23251042.2022.2124622

Alamsyah, I. E. (2024). *Jadi Penyumbang Emisi Terbesar, Cina Bertekad Majukan Kebijakan Ramah Lingkungan*. Https://Internasional.Republika.Co.Id/. https://internasional.republika.co.id/berita/s9vfou349/jadi-penyumbang-emisi-terbesar-cina-bertekad-majukan-kebijakan-ramah-lingkungan

Andrian, T., & Kevin. (2021). Determinant Factors of Carbon Emission Disclosure in

Indonesia. *Journal of Southwest Jiaotong University*, *56*(1), 345–357. https://doi.org/10.35741/issn.0258-2724.56.1.32

Angarita-baéz, J. A., Pérez-miñana, E., Vargas, J. E. B., Agudelo, A. R., Ortiz, A. P., Palacios, E., Willcock, S., Pérez-miñana, E., & Vargas, J. E. B. (2017). Assessing and mapping cultural ecosystem services at community level in the Colombian Amazon. *International Journal of Biodiversity Science, Ecosystem Services & Management*, *13*(1), 280–296. https://doi.org/10.1080/21513732.2017.1345981

Ansell, C., & Gash, A. (2017). Collaborative Platforms as a Governance Strategy. *Journal of Public Administration Research and Theory*, *28*(1), 16–32. https://doi.org/10.1093/jopart/mux030

Atanga, R. A. (2023). Planned experiments or autonomous adaptation? An assessment of initiatives for climate change adaptation at the local level in Ghana. *Cogent Social Sciences*, *9*(2), 1–21. https://doi.org/10.1080/23311886.2023.2282719

Auerswald, K., Moyle, P., Seibert, S. P., & Geist, J. (2019). HESS Opinions: Socio-economic and ecological trade-offs of flood management -- benefits of a transdisciplinary approach. *Hydrology and Earth System Sciences*, *23*(2), 1035–1044. https://doi.org/10.5194/hess-23-1035-2019

Badan Kebijakan Fiskal, K. K. R. (2018). *Pendanaan Publik untuk Pengendalian Perubahan Iklim Indonesia 2016-2018*. Kementerian Keuangan RI.

Bajwa, S. U., Kitchlew, N., Shahzad, K., & Rehman, K. U. (2018). Public–Private Partnership (PPP) as an Interdependent Form (I-Form) Organization. *International Journal of Public Administration*, *41*(11), 859–867. https://doi.org/10.1080/01900692.2017.1298610

Barbosa, O., & Alves, C. (2014). A Systematic Mapping Study on Software Ecosystems. *2014 International Conference on Signal Propagation and Computer Technology, ICSPCT 2014*, 15–26. https://doi.org/10.1109/ICSPCT.2014.6884971

Bertilsson, J., & Soneryd, L. (2023). Indigenous peoples and inclusion in the green climate fund. *Environmental Sociology*, *9*(3), 233–242. https://doi.org/10.1080/23251042.2023.2177091

Botchway, T. P. (2021). Implementing effective environmental policies for sustainable development: Insight into the implementation of the CBD in Ghana. *Cogent Social Sciences*, *7*(1), 1–17. https://doi.org/10.1080/23311886.2021.1970893

Brereton, P., Kitchenham, B., Budgen, D., Turner, M., & Khalil, M. (2007). Lessons from applying the systematic literature review process within the software engineering domain. *J. Syst. Softw.*, *80*, 571–583.

Cahyo, H., Purnomo, S. D., Octisari, S. K., Surveyandini, M., Sundari, S., & Purwendah, E. K. (2023). Environment, Population, and Economy on CO2 Emission in Indonesia. *International Journal of Energy Economics and Policy*, *13*(6), 295–303. https://doi.org/10.32479/ijeep.14938

Chen, C., & Liu, W. (2023). Advances and future trends in research on carbon emissions reduction in China from the perspective of bibliometrics. *PLoS ONE*, *18*(7), 1–23. https://doi.org/10.1371/journal.pone.0288661

Court, A., Kelly, A., & Hardman, M. (2022). Exploring the need for innovation in greening urban environments: Reflecting on radical practice in Greater Manchester, UK. *Cogent Social Sciences*, *8*(1), 1–17. https://doi.org/10.1080/23311886.2022.2109261

Daly, P., Mahdi, S., Mundir, I., McCaughey, J., Amalia, C. S., Jannah, R., & Horton, B. (2023). Social capital and community integration in post-disaster relocation settlements after the 2004 Indian Ocean Tsunami in Indonesia. *International Journal of Disaster Risk Reduction*, *95*, 1–14.

https://doi.org/10.1016/j.ijdrr.2023.103861
Demetriou, P. (2022). Hotel food waste in Cyprus: An exploratory case study of hotels in Limassol. *Cogent Social Sciences*, *8*(1), 1–32. https://doi.org/10.1080/23311886.2022.2026556
Dlamini, S. (2020). A comparative analysis of the quality of Community Police Forums in local Cato Manor & Glenwood communities, South Africa. *Cogent Social Sciences*, *6*(1), 1–10. https://doi.org/10.1080/23311886.2020.1809141
Dube, T., Sibanda, S., & Chiwara, P. (2021). Adapting peri-urban agriculture to climate change in Bulawayo, Zimbabwe: A qualitative assessment. *Cogent Social Sciences*, *7*(1), 1–16. https://doi.org/10.1080/23311886.2021.1944486
Elliott, L., & Setyowati, A. B. (2020). Toward a Socially Just Transition To Low Carbon Development: the Case of Indonesia. *Asian Affairs*, *51*(4), 875–894. https://doi.org/10.1080/03068374.2020.1835000
Gabriel, A. G., De Vera, M., & Marc, M. A. (2020). Roles of indigenous women in forest conservation: A comparative analysis of two indigenous communities in the Philippines. *Cogent Social Sciences*, *6*(1), 1–18. https://doi.org/10.1080/23311886.2020.1720564
Godden, N. J., Wijekoon, D., & Wrigley, K. (2022). Social (In)justice, climate change and climate policy in Western Australia. *Environmental Sociology*, *8*(4), 377–387. https://doi.org/10.1080/23251042.2022.2069216
Hardoy, J., & Pandiella, G. (2009). Urban poverty and vulnerability to. *ENVIRONMENT & URBANIZATION*, *21*(1), 203–224. https://doi.org/10.1177/0956247809103019
Holmqvist, M., & Pessi, K. (2006). Agility through scenario development and continuous implementation: A global aftermarket logistics case. *European Journal of Information Systems*, *15*(2), 146–158. https://doi.org/10.1057/palgrave.ejis.3000602
Huxham, C., Vangen, S., Huxham, C., & Eden, C. (2000). Challenge of Collaborative Governance. *An International Journal of Research and Theory*, *2*(3), 337–358. https://doi.org/10.1080/14719030000000021
Institute for Essential Services Reform. (2021). *Laporan Climate Transparency 2021: Dampak Perubahan Iklim Nyata, Indonesia Perlu Tingkatkan Aksi Iklimnya*. Https://Iesr.or.Id/. https://iesr.or.id/laporan-climate-transparency-2021-dampak-perubahan-iklim-nyata-indonesia-perlu-tingkatkan-aksi-iklimnya
IPCC. (2007). *Climate Change 2007: Impacts, Adaptation and Vulnerability*.
Jakob, M. (2022). Globalization and climate change: State of knowledge, emerging issues, and policy implications. *Wiley Interdisciplinary Reviews: Climate Change*, *13*(4), e771.
Jørgensen, M., & Shepperd, M. (2007). A systematic review of software development cost estimation studies. *IEEE Transactions on Software Engineering*, *33*(1), 33–53. https://doi.org/10.1109/TSE.2007.256943
Karki, S., Burton, P., & Mackey, B. (2020). Climate change adaptation by subsistence and smallholder farmers: Insights from three agro-ecological regions of Nepal. *Cogent Social Sciences*, *6*(1), 1–23. https://doi.org/10.1080/23311886.2020.1720555
Khatri, D. B., Nightingale, A. J., Ojha, H., Maskey, G., & Lama 'Tsumpa,' P. N. (2022). Multi-scale politics in climate change: the mismatch of authority and capability in federalizing Nepal. *Climate Policy*, *22*(8), 1084–1096. https://doi.org/10.1080/14693062.2022.2090891
Kitchenham, B., Pearl Brereton, O., Budgen, D., Turner, M., Bailey, J., & Linkman, S. (2009). Systematic literature reviews in software engineering - A systematic literature review. *Information and Software Technology*, *51*(1), 7–15.

https://doi.org/10.1016/j.infsof.2008.09.009
Lamb, W. F., Gasser, T., Roman-Cuesta, R. M., Grassi, G., Gidden, M. J., Powis, C. M., Geden, O., Nemet, G., Pratama, Y., Riahi, K., Smith, S. M., Steinhauser, J., Vaughan, N. E., Smith, H. B., & Minx, J. C. (2024). The carbon dioxide removal gap. *Nature Climate Change*. https://doi.org/10.1038/s41558-024-01984-6
Lestari, N. (2019). Factors Causing Failure of the REDD + Program Implementation in Central Kalimantan M ethod s. *Jurnal Manajemen Hutan Tropika*, *25*(1), 28–34. https://doi.org/10.7226/jtfm.
Li, W., & von Essen, E. (2021). Guarding crops from monkey troops: farmer-monkey interaction near a nature reserve in Guangxi, China. *Environmental Sociology*, *7*(1), 12–24. https://doi.org/10.1080/23251042.2020.1811004
Liu, Z., Deng, Z., Davis, S., & Ciais, P. (2023). Monitoring global carbon emissions in 2022. *Nature Reviews Earth and Environment*, *4*(4), 205–206. https://doi.org/10.1038/s43017-023-00406-z
Macheka, M. T. (2021). Environmental management and practises in Zimbabwe's Chivi district: A political ecology analysis. *Cogent Social Sciences*, *7*(1), 1–18. https://doi.org/10.1080/23311886.2021.2000569
Manzoor, Z., Ehsan, M., Khan, M. B., Manzoor, A., Akhter, M. M., Sohail, M. T., Hussain, A., Shafi, A., Abu-Alam, T., & Abioui, M. (2022). Floods and flood management and its socio-economic impact on Pakistan: A review of the empirical literature. *Frontiers in Environmental Science*, *10*, 1–14. https://doi.org/10.3389/fenvs.2022.1021862
Matti, S., Petersson, C., & Söderberg, C. (2021). The Swedish climate policy framework as a means for climate policy integration: an assessment. *Climate Policy*, *21*(9), 1146–1158. https://doi.org/10.1080/14693062.2021.1930510
MMR Portal. (2023). *Kaltim Satu-satunya Provinsi Terima Insentif Penurunan Karbon Rp 1,7 T dari World Bank*. Mrv.Kaltimprov.Go.Id. https://mrv.kaltimprov.go.id/id/post-page-detail/kaltim-satu-satunya-provinsi-terima-insentif-penurunan-karbon-rp-1-7-t-dari-world-bank
Mulyani, M., & Jepson, P. (2013). REDD + and Forest Governance in Indonesia : A Multistakeholder Study of Perceived Challenges and Opportunities. *Journal of Environment & Development*, *22*(3), 261–283. https://doi.org/10.1177/1070496513494203
Nursulistyo, E. D., Aryani, Y. A., & Bandi, B. (2022). The Disclosure of Carbon Emission in Indonesia: A Systematic Literature Review. *Jurnal Dinamika Akuntansi Dan Bisnis*, *10*(1), 1–18. https://doi.org/10.24815/jdab.v10i1.27974
Ofoegbu, C., & Ifejika Speranza, C. (2021). Making climate information useable for forest-based climate change interventions in South Africa. *Environmental Sociology*, *7*(4), 279–293. https://doi.org/10.1080/23251042.2021.1904534
Peraturan Presiden Nomor 98 Tahun 2021 tentang Penyelenggaraan Nilai Ekonomi Karbon untuk Pencapaian Target Kontribusi yang Ditetapkan Secara Nasional dan Pengendalian Emisi Gas Rumah Kaca dalam Pembangunan Nasional.
Petersen, K., Feldt, R., Mujtaba, S., & Mattsson, M. (2008). Systematic Mapping Studies in Software Engineering. *12th International Conference on Evaluation and Assessment in Software Engineering (EASE) (EASE)*, 1–10. https://doi.org/10.4013/base.2015.124.06
Phiri, K., Nhliziyo, M., Madzivire, S. I., Sithole, M., & Nyathi, D. (2021). Understanding climate smart agriculture and the resilience of smallholder farmers in Umguza district, Zimbabwe. *Cogent Social Sciences*, *7*(1), 1–16.

https://doi.org/10.1080/23311886.2021.1970425
Pratama, R. A. (2022). *RI Terima Dana Hibah Lingkungan US$ 100 Juta, Paling Banyak di Dunia*. Https://Katadata.Co.Id/. https://katadata.co.id/ekonomi-hijau/investasi-hijau/63734fb5361b0/ri-terima-dana-hibah-lingkungan-us-100-juta-paling-banyak-di-dunia
Purwowidhu, C. (2023). *Bersama Atasi Perubahan Iklim*. Mediakeuangan.Kemenkeu.Go.Id. https://mediakeuangan.kemenkeu.go.id/article/show/bersama-atasi-perubahan-iklim
Qin, C., Xue, Q., Zhang, J., Lu, L., Xiong, S., Xiao, Y., Zhang, X., & Wang, J. (2024). A Beautiful China Initiative Towards the Harmony between Humanity and the Nature. *Frontiers of Environmental Science and Engineering*, *18*(6), 1–9. https://doi.org/10.1007/s11783-024-1831-4
Quang, N. M., Thien, N. P. N., Thu, N. H., Thoa, H. T. N., Tho, T. M., Hieu, L. M., & Thinh, D. Q. (2023). Determinants of farmers' adoption of adaptation measures in carbon-intensive agricultural areas: A case study in An Giang province, Vietnam. *Cogent Social Sciences*, *9*(2), 1–17. https://doi.org/10.1080/23311886.2023.2262769
Sahabuddin, C., Muliaty, M., Farida, U., Hasbi, & Yusriadi, Y. (2019). Administration of post-reformation decentralization government. *International Journal of Recent Technology and Engineering*, *8*(3), 7631–7634. https://doi.org/10.35940/ijrte.C6182.098319
Setiadi, S., Sumaryana, A., Bekti, H., & Sukarno, D. (2023). The flood management policy in Bandung city: Challenges and potential strategies. *Cogent Social Sciences*, *9*(2), 1–13. https://doi.org/10.1080/23311886.2023.2282434
Shehri, T. Al, Braun, J. F., Howarth, N., Lanza, A., & Luomi, M. (2023). Saudi Arabia's Climate Change Policy and the Circular Carbon Economy Approach. *Climate Policy*, *23*(2), 151–167. https://doi.org/10.1080/14693062.2022.2070118
Shittu, W., Adedoyin, F. F., Shah, M. I., & Musibau, H. O. (2021). An investigation of the nexus between natural resources, environmental performance, energy security and environmental degradation: Evidence from Asia. *Resources Policy*, *73*(102227). https://doi.org/https://doi.org/10.1016/j.resourpol.2021.102227
Siswoko, B. (2008). Pembangunan, Deforestasi dan Perubahan Iklim. *Jurnal Manajemen Hutan Tropika*, *14*(2), 89–96.
Sriartha, I. P., Giyarsih, S. R., & Purnamawati, I. G. A. (2023). Comparing the adaptive capacity of traditional irrigated rice fields farmers in urban and rural areas to climate change in Bali, Indonesia. *Cogent Social Sciences*, *9*(2), 1–21. https://doi.org/10.1080/23311886.2023.2275936
Subari, W. A. (2023). *Dampak Perubahan Iklim terhadap Pangan Tingkatkan Risiko Gagal Panen*. Mediaindonesia.Com. https://mediaindonesia.com/humaniora/594308/dampak-perubahan-iklim-terhadap-pangan-tingkatkan-risiko-gagal-panen
Sudiar, S., Rauf, A., Kurnia, M. P., & Helza, Z. Z. (2023). Identity securitization of local communities in the capital region nusantara. *INOVASI: Jurnal Ekonomi, Keuangan Dan Manajemen*, *19*(4), 839–846.
Tene, N. S. T. (2022). Cameroon's adaptation to climate change and sorghum productivity. *Cogent Social Sciences*, *8*(1), 1–23. https://doi.org/10.1080/23311886.2022.2140510
Ulibarri, N., & Scott, T. A. (2016). Linking Network Structure to Collaborative Governance. *Journal of Public Administration Research and Theory*, 1–19.

https://doi.org/10.1093/jopart/muw041
Undang-Undang Nomor 16 Tahun 2016 tentang Pengesahan Paris Agreement.
UNFCCC. (2006). *United Nations Framework Convention on Climate Change*. http://unfccc.int/%0Aresource/docs/publications/handbook.pdf
van Wee, B., & Banister, D. (2023). Literature review papers: the search and selection process. *Journal of Decision Systems*, *33*(4), 559–565. https://doi.org/10.1080/12460125.2023.2197703
Westskog, H., Aarsæther, N., Hovelsrud, G. K., Amundsen, H., West, J. J., & Dale, R. F. (2022). The transformative potential of local-level planning and climate policies. Case studies from Norwegian municipalities. *Cogent Social Sciences*, *8*(1), 1–17. https://doi.org/10.1080/23311886.2022.2033457
Xie, Z. (2020). China's historical evolution of environmental protection along with the forty years' reform and opening-up. *Environmental Science and Ecotechnology*, *1*(100001), 1–8. https://doi.org/10.1016/j.ese.2019.100001
Yamba, S., Appiah, D. O., & Siaw, L. P. (2019). Smallholder farmers' perceptions and adaptive response to climate variability and climate change in southern rural Ghana. *Cogent Social Sciences*, *5*(1), 1–23. https://doi.org/10.1080/23311886.2019.1646626
Zhao, X., Mignone, B. K., Wise, M. A., & McJeon, H. C. (2024). Trade-offs in land-based carbon removal measures under 1.5 °C and 2 °C futures. *Nature Communications*, *15*(1), 1–13. https://doi.org/10.1038/s41467-024-46575-3
Zhou, H., Li, D., Mustafa, F., & Altuntas, M. (2020). Natural resources volatility and South Asian economies: Evaluating the role of COVID-19. *Rosources Policy*, *75*, 1–10.
Zimmermann, T., Shinde, S., Parthasarathy, D., & Narayanan, N. C. (2023). Linking climate change adaptation and disaster risk reduction: reconceptualizing flood risk governance in Mumbai. *Journal of Integrative Environmental Sciences*, *20*(1), 1–29. https://doi.org/10.1080/1943815X.2023.2169712