Policy analysis of the adaptation of Makassar city’s government for climate change and global warming

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Abstract. Government plays important role in adapting, planning, and implementing to work and Program succeeded with the right target depend on central government, regional government, and national institutions, also international institution involvement. The research aims to analyze Makassar regional government to adapt to climate-changing by seeing programs include adaptation, funding pattern, and knowledge of regional government about climate changing and global warming issues. Research implementing in Makassar in August-October and continued by doing a comparative study in Semarang to complete the data. Sampling uses non-probability sampling with a purposive sampling approach. Data analysis using descriptive, qualitative, and comparative. The result has shown Makassar regional Government has been responding to climate changing. This is shown by policy and adaptation strategy in document RAD-API. But, the government has a barrier in coordinating and funding their implementation. This makes the adaptation could not work effectively. Further, the lack of government knowledge about climate changing and global warming issues also contributes to preventing integration of policy process to regional development planning.

1. Introduction
The issue of climate change and global climate has become a serious problem that and contribute a negative impact on the environment since the crisis in Rio the Janeiro in 1972. Global warming that occurs due to the availability of greenhouse gases (GHG) in the atmosphere has caused global climate change. The increase of greenhouse gases was caused by activities on the earth's surface, both by nature and by humans. An example of a natural activity that has an impact on increasing the greenhouse gases in the atmosphere is the occurrence of volcanic eruptions that release certain gases when they erupt. And human activities (anthropogenic) have contributed massive and significantly to the increasing greenhouse gases.

Indonesia as an archipelago with a land area of 1.9 million kilometres square and an ocean area of 5.8 million kilometres square causes most of the population to live in coastal areas. Based on these conditions, Indonesia is very vulnerable to the impacts of climate change and global climate. It is indicated by some disaster events like floods and droughts. Based on disaster data [1] the occurrence of floods in South Sulawesi caused many people to become victims. The area with the most number of victims affected was: Wajo Regency with 56,122 fatalities, Makassar City with 2,328 people, Soppeng
with 2,217 people, and many other areas. Furthermore, these floods also destroy massive public facilities. Makassar City was at the third rank with the highest amount of damage, within 10 facilities has broken, run after Jeneponto Regency (with 15 facilities) and Wajo Regency (with 102 facilities.) The effect of global warming that causes climate change is also can be seen from the reduction in rainfall below normal. According to drought data for South Sulawesi [1], Makassar City is the area with the highest number of victims due to the water crisis, reaching 564,612 people, then Jeneponto Regency 361,793 people and Maros 7,100 people.

The Indonesian government has declared to participate in the programs to reduce the impact of the global crisis and change since the Climate Change Conference was first held. Not only to reduce but also to adapt and mitigate the impacts of climate change and global warming. However, nowadays the regulation of government policies of climate change and global warming considered not comprehensively covered by policies in sectors related to climate change and global climate management. These sectors include the energy, forestry, agriculture, fisheries, transportation, health sectors, which have only general policies in planning to adaptation programs but have not focused on developing and implementing climate change adaptation plans and global warming.

The research was carried out within the scope of the Makassar City government which consisted of several related institutions and Makassar Representative Council (DPRD). The selected informants cover all institutions and Makassar City government all related to climate change adaptation policies and global warming. This Research was carried out from August to September 2020.

Data collection was carried out by using document study techniques, which collect data on physical and non-physical programs and institutions related with an environmental focus within the scope under the auspices of the Makassar City government. The data obtained were then grouped into several groups based on their relation to the RAD-API program and concluded the adaptation patterns that occurred in the Makassar City government.

In addition to document studies, other data collection regarding climate change adaptation policies was carried out through interviews, questionnaires, and literary studies. Interviews were conducted with functionaries in Makassar city Government regarding to development conditions of climate change adaptation policies and global warming programs. The questionnaire as a research support instrument will be distributed to each respondent who works within the Makassar city government to find out how far the respondents understand the issues of climate change and global warming and the need for adaptation action.

The sampling technique in this study is a non-probability sampling technique with a purposive sampling approach in selecting samples from the population, it is carried out not randomly and is based on certain considerations made by the researchers themselves based on previously known characteristics or characteristics of the population [2].

2. Results and discussion

2.1. Correlation of government programs with climate change adaptation and global development in Makassar City

This research was conducted by analyzing the government's adaptation policies and programs to the issue of climate change and global warming through reviewing regional development plan documents, named strategic plan (Renstra) / work plan (Renja) of Makassar city government institution and RPJMD documents which are considered to be included in policies or programs. Adaptation of government to climate change and global warming.

2.1.1. Food security service. Food vulnerability is a challenge for the Indonesian government, especially the Makassar City government from time to time. So that to overcome these problems the government has made various efforts through the formation of programs related to food security.
Table 1 shows that there are several government programs, in this case, the Makassar City Food Security Service, which is related to strengthening food security against the impacts of climate change such as food availability and production programs and food security enhancement programs as an effort to increase food access for households in sub-district as a program to reduce the prevalence of food-insecure residents in Makassar City. Furthermore, through the Food Safety Supervision and Control program and the Food Insecurity and Distribution program, the Makassar City government seeks to improve supervision, control, vigilance, security, and food availability in the agricultural sector of Makassar City.

2.1.2. Department of Marine Agriculture, Fisheries and Livestock (DKP3). The Makassar City Government committed to increasing the value of the fishery and marine production at DKP3 Makassar City through mitigation programs for natural marine disasters and climate forecasting, improvement and development of fishery products as well as programs for improving the quality and hygiene products of fishery products (table 2). Furthermore, in supporting the availability of food and the welfare of the community, the Makassar City government tends to increase the value of animal husbandry businesses through programs to increase the application of livestock technology and for the prevention and control of livestock diseases. In order to realize an increase in the agricultural business, the Makassar City government has developed a vertical garden farm and increased agricultural production and the development of organic and horticultural agriculture.

The results of the study by Mustafa et al.[4] shown that the food security index in Makassar City is based on a combination of three components, namely food stability, food affordability accessibility, and food quality and safety are categorized as Food Deficiency. Therefore, the existence of these programs is very important to maintain food stability and the social-economic welfare of the people in Makassar City so that they are more resilient in facing the impacts of climate change and are able to adapt to existing vulnerabilities.

2.1.3. Environment and Forestry Service. The Makassar City Government, in this case, the environmental and forestry service, aims to improve the quality and function of the environment through efforts to prevent and control water and air pollution with several programs listed in the RKPD, namely the green open space management program (RTH), increasing the capacity of urban greening, solid waste, and B3 waste management performance development program, and environmental pollution and destruction control program (table 3). Then, through the SDA protection and conservation program, the Makassar City government seeks to improve the protection and supervision functions in the sustainable management of natural resources in Makassar City.
Table 2. Policies and programs of the agriculture, fishery, and livestock service related to adaptation to climate change and global warming [5].

| Purpose | Target | Strategy | Policy | Program |
|---------|--------|----------|--------|---------|
| Increasing production value of fisheries and marine | - Increasing fisheries and marine and fisher welfare | - Efficient Program for Fisheries and Marine | - Fostering and mentoring business actors | - Marine natural disaster mitigation and climate forecasting |
| | - Increased number of coastal society and small islands (PKK) and the perpetrator of the illegal fishing that has nurtured and spacious | - Coaching empowerment coastal and small island community | - Supporting the availability of production facility | - Improvement and development fishery production |
| | | | - Increasing awareness of coastal and small island society | - Quality improvement and product hygiene fishery product |
| | | | - Monitoring and law enforcement violations of marine, coastal and small island resource management | |
| | | | - Marine natural disaster mitigation and climate forecasting | |
| Increasing the value of fishery business | Realizing the prevention and control of livestock diseases to support food security of animal origin, as well as increase the added value of animal husbandry businesses | Increasing the percentage of the safe, healthy, whole, and halal food from livestock by utilizing households | Supervision of food safety from livestock | Increasing the implementation of livestock technology |
| | | | - Guidance for managing livestock | - Prevention and control of livestock diseases |
| Increasing agricultural business | Increasing agricultural business and which have added value and potential for market | - Empowerment of “lorong” communities as a program to improve green areas | - Arrangement and expansion of green open space | - Development of a vertical farm garden |
| | | - Improve the community's economy to increase agricultural and processed agricultural products | - Tunnel-based economic scale business development | - Increase in agricultural production and development of organic agriculture |
| | | | - Development of aisle-based agriculture by developing a garden aisle and a roof garden | |
**Table 3.** Environmental Agency Policies and programs related to climate change adaptation and global warming [6].

| Propose | Target | Strategy | Policy | Program |
|---------|--------|----------|--------|---------|
| Improve the quality and function of the environment through a program to prevent and control water and air pollution | - Maintaining water and air quality | - Improve water and ambient air quality at the monitor point | - Monitoring and supervision of water and air pollution indices | - Green open space management program |
| | - Improving waste management | - Optimize management and reduction of waste | - Developing solid waste management performance through the provision of solid waste facilities and infrastructure, improving the operation and maintenance of solid waste facilities and infrastructure, and developing solid waste processing technology | - Improving green city program |
| | | | - Community assistance and empowerment for waste management | - Program development and performance of the waste management of B3 waste (hazardous, non-toxic, odorless) |
| | | | | - Controlling pollution and environmental damage |

| Improve the protection and supervision functions in the sustainable management of natural resources | - Maintenance of water catchment areas and water sources | - Increasing awareness and active participation of the community in environmental preservation | - Fostering groups for the preservation of environmental functions | Natural Resources Protection and Conservation Program |
| | - Improved coordination function in the identification of vegetation cover to increase community participation in preserving environmental functions and controlling the impacts of climate change | - Improve controlling of climate change impacts | - Fostering and providing stimulants to communities implementing climate change adaptation and mitigation. |

2.1.4. Public Works Service. Public Works Service of Makassar City has suggested some policies and programs in regard to climate changes and global warming (table 4).
Table 4. Policies and programs of the Makassar City Public Works Service regarding adaptation to climate change and global warming [7].

| Propose                                                                 | Target                                                                 | Strategy                                                                 | Policy                                                                 | Program                                                                 |
|------------------------------------------------------------------------|------------------------------------------------------------------------|-------------------------------------------------------------------------|------------------------------------------------------------------------|-------------------------------------------------------------------------|
| Improving the quality of flood control in an integrated way in improving the quality of drainage/sewer on the waterworks to realize Makassar World Cities comfortable and safe for all | Increasing the quality of urban settlement drainage                    | - planning of drainage development stages under the financing capacit
- development of private sector involvement in financing the construction of drainage
- drainage construction adjustments to environmental conditions and climate
- planning stages of drainage maintenance under the financing capacity
- increase community participation in drainage maintenance             | Provision of quality drainage infrastructure throughout the city       | - Build construction of drainage channels/curvets
- Rehabilitation of maintenance of drainage / sewer
- Management of flood control                                          |
| Improving the quality of clean water service infrastructure coverage to meet community needs. | Improve the quality of clean water services to meet community needs | Planning construction of clean water networks                          | Achieve the MDGs 100% access to clean water                          | The provision and management of clean water                              |
| Realization of the wastewater system infrastructure quality and equitable | Improve the service quality of residential wastewater systems        | - Sanitation development from simple to piping with wastewater in residential areas
- development of water piping system of household waste                | Develop measured and integrated municipal and regional IPAL systems in an integrated area. | - Development of wastewater management performance
- Improving the maintenance of facilities and infrastructure wastewater management |

2.1.5. Spatial Planning and Building Office. One of the indirect forms of adaptation to climate change by the Makassar City government is through a spatial and building planning program. Therefore, in order to realize an integrated use and spatial planning in the area of Makassar, the government has implemented a program that includes matters related to climate change adaptation. While these programs
are spatial and building utilization programs, spatial use control programs, and spatial planning programs (table 5).

**Table 5.** Policies and programs of the Makassar city spatial planning office related to climate change adaptation and global warming [8].

| Propose | Target | Strategy | Policy | Program |
|---------|--------|----------|--------|---------|
| Improve utilization and spatial planning, including land in an integrated and consistent manner | The realization of utilization and integration of spatial planning | - preparation of detailed spatial plans in strategic city areas<br>- Improved utilization of space and space utilization control through surveillance, investigation, and publishing<br>- Controlling space utilization through zoning regulations, providing incentives, and imposing sanctions. | Improve the quality of space utilization implementation and promote integrated regional infrastructure development and implementation of regional development programs | - Utilization of space and buildings<br>- Space utilization control<br>- Spatial Planning |

2.2. The form of integration of the RAP-API strategy into Makassar City Local Government Work Plan (RKPD) Program

Based on the analysis of the Makassar City RKPD document, an analysis of the suitability of the adaptation strategy was carried out in the Regional Action Plan for Climate Change Adaptation (RAD-API) Makassar City (2015-2020). This analysis is carried out based on the division of resilience sectors in the RAN-API document which is vulnerable to climate change. The results of the analysis of the suitability of the Makassar City Government RKPD program (2015-2020) with the Makassar City RAD-API strategy [9] are presented in table 7.

**Table 6.** Suitability of the RKPD Program for Makassar City with the 2015 RAD-API strategy.

| No | Adaptation Strategy of RAD-API Makassar | Government Programs | Implementor Institution |
|----|----------------------------------------|---------------------|------------------------|
| 1. | Increase and expanding Green Open Space | a. Management of Green Open Space<br>b. Capacity Building for City Greening<br>c. Garden “Lorong” Development | DLH<br>DLH<br>DP3 |
2. **Improving the Quality of Infrastructure and Public Services**
   - Development of drainage/sewer
   - Rehabilitation or maintenance of drainage channels and culverts
   - Clean water supply and management
   - Improved maintenance wastewater management infrastructure

3. **Economic and Social Welfare Improvement**
   - Improvement and development of food production
   - Improving the quality and hygiene of agricultural products
   - Increase in agricultural production and development of organic agriculture
   - Improved maintenance wastewater management infrastructure

4. **Increased Public Participation**
   - Increase in agricultural production and development of organic agriculture
     - Socialization of Plant Supervision and Protection
     - Deliberation Tani Abbulo Sibatang
   - The development program of waste management performance and B3
     - Competitions cleanliness and beauty of the environment
     - Socialization of B3 waste management
     - Socialization of capacity building for solid waste management policies
     - Increasing community participation in solid waste management
     - Integrated Waste Management 3 R-based society
   - Capacity building and community participation programs
     - Development of proclaim village in Makassar City
     - Climate Change and environmental week, Indonesia expo, Makassar expo, and F8

5. **Capacity Building for Government Institutions, NGOs, CSOs**
   - Socialization of strengthening food security to district and sub-district government officials
   - Coordination of food consumption with related institutions
The table above shows that the Makassar City government has responded to the issue of climate as all strategies in the Makassar City RAD-API document have been integrated with the RKPD program. However, not all Makassar City institutions related to sectors vulnerable to climate change have adopted the RAD-API strategy into the RKPD routine program. Based on the table above, it can be concluded that the government’s commitment to climate change adaptation is still low, specifically in facing the main problem of climate change impacts in Makassar City. At first, in the flood control program, this can be seen from the low level of government capacity building, in this case, cross-sectoral coordination in flood management and control, infrequent of socialization and community empowerment. Second, the weakness of regulations regarding programs that affect the resilience of cities in dealing with climate change issues. It was related to Perdinan statement [10] which states that “Coordination between the Central Government, Local Government and the community plays an important role in planning and implementing climate change adaptation. Therefore, the cooperation/coordination mechanism needs to be further regulated. Programs related to climate change such as the Climate Village can be the basis for formulating the cooperation/coordination mechanism.
As comparative data, this study takes Semarang City as one of the RAN-API Pilot Cities to compare the strategies in the RAD-API document for Makassar City with the adaptation strategy in Semarang City RAD-API document [11].

Table 7. Adaptation strategy in the Semarang City RAD-API document.

| No | Adaptation Strategy of RAD-API Semarang | Government Programs | Implementor Institution |
|----|----------------------------------------|---------------------|-------------------------|
| 1. | Strengthening regulations related to climate change adaptation | 1. Drafting regulations on building structure and environment in tidal inundation zones | Bappeda, BPBD, Dinas Permukiman, DTR |
|    |                                        | 2. Establishment and enforcement of zoning regulations as well as building and environmental regulations in relocation areas | Bappeda, DTR |
| 2. | Develop an innovative financing system to encourage the implementation of climate change adaptation actions | 1. Government Cooperation System Development Enterprises (KPBU) for infrastructure financing | Bappeda, Bappenda, DPKAD |
|    |                                        | 2. The development of innovation in the determination of tax disincentives incentive mechanisms based on regional ecosystem services to increase revenue (PAD) | Bappenda |
|    |                                        | 3. Development of alternative microfinance (microfinance) for climate change adaptation | Bappeda, DPKAD, Bappenda |
|    |                                        | 4. Provision of contingency funds for asset owners affected by disasters | Bappeda, BPBD |
|    |                                        | 5. Procurement system of disaster contingency fund as a result of climate change (climate-related disaster) to the public | Bappeda, BPDB |
|    |                                        | 6. Diversification of income sources for coastal communities | Bappeda, Bappenda Dinas Koperasi dan UMKM |
| 3. | Optimizing regional arrangement adaptive to climate change | 1. Zoning canopy of trees in each area (BWK level or less) (urban greening) | Bappeda, DLH, DTR |
|    |                                        | 2. Determination of the invasion-prone zones animals | DLH |
|    |                                        | 3. Zoning and utilization of groundwater monitoring mechanism and strict licensing | Bappeda, DPU, DTR |
|    |                                        | 4. Mapping of disaster-prone areas | BPBD |
|    |                                        | 5. Development and development of tourism areas that are comfortable and resilient to disasters | Disbudpar, BPBD |
| 6. Optimization of tourism potential that accommodates the climate change phenomenon | Disbudpar, Bappeda |
|-------------------------------------------|------------------|
| 7. Use of zoning and control of development in coastal areas | BAPPEDA, DTR, Dinas Kelautan dan Perikanan |

| 4. Develop climate-resilient facilities and infrastructure |
|-------------------------------------------------|----------------------------------|
| 1. Development of adaptive settlements to climate change | Disperkim, Bappeda, DPU |
| 2. Infrastructure development to improve the resilience of coastal areas | Bappeda, DPU |
| 3. Development of complementary facilities for urban roads (street furniture) that are accommodative to climate phenomena | DPU, DISHUB, DKP |
| 4. Development of public transportation facilities integrated to health facility service points | DISHUB, DINKES |
| 5. Development of agricultural activities with system Smart Agriculture | DP |
| 6. Development of irrigation facilities formidable dansistem climate | Bappeda, DPU |
| 7. Application of environmentally friendly building concepts (green building) in urban areas | Bappeda, DPU |

| 5. Developing information systems related to climate change |
|-------------------------------------------------|------------------|
| 1. Development of an early warning system for disasters and driving safety | DISHUB |
| 2. Development of information systems related to climate impacts and phenomena | BMKG, BPBD, DISKOMINFO |

| 6. Optimizing facility of society clean water needs |
|-------------------------------------------------|------------------|
| 1. Increasing the reach of PDAM services | DPU, PDAM |
| 2. Development of an alternative clean water supply system | BAPPEDA, DPU |

| 7. Increase groundwater conservation activities |
|-------------------------------------------------|------------------|
| 1. Reforestation and Afforestation with standing crops or those capable of strengthening the soil | DLH, BPBD |
| 2. Conservation and improvement of catchment areas and the extent of the rainwater catchment area | DLH, DPU |

| 8. Developing agricultural systems that are adaptive to climate change |
|-------------------------------------------------|------------------|
| 1. Development of puddle tolerant varieties | DP |
| 2. Development of salinity tolerant varieties | DP |
3. Development of drought-tolerant varieties  
4. Development of tolerant varieties for organisms  

9. Develop proactive health care systems to the phenomenon of climate change  
   Development of health facilities services pro-actively to the impacts of climate change  
   DINKES  

10. Raise public awareness regarding climate change  
    1. Disseminating information about the impact of climate change through educational curricula  
    2. Utilization of the social media network system  
    3. Disseminating information related to health threats due to gender-specific climate change  
    DISDIK, DINKES, DISKOMINFO, DP3A, DINKES, DISDIK  

11. Integration of gender in climate change adaptation activities  
    Improve women involvement in climate change adaptation activities  
    DP3A, DLH  

Based on table 7, it can be seen that the adaptation strategy in the RAD-API document for Semarang City has differences in the number of program focus strategies, and the level of cross-sectoral coordination. It cannot be separated from the good interaction between elements of policymakers. Aisya's research results [12] stated that the existence of vertical interactions shows that the formulation of climate change adaptation policies in Semarang City is driven by negotiations on the climate change adaptation agenda at the international and national levels. Meanwhile, in the horizontal interaction, the Semarang City Government collaborated with the Mercy Corps -ACCCRN in formulating inclusive policies through discussion forums between institutions. While the adaptation strategy in the RAD-API of Makassar City is in terms of smaller numbers, the adaptation program is still general in nature, there is no division of workgroups and coordination in the climate change adaptation strategy. However, the existence of the Makassar City RAD-API document indicates that the government has responded to climate change in Makassar City.

2.3. The budgeting pattern for climate change adaptation program cost and global warming in Makassar City

Based on figure 1, the budget for natural disaster mitigation programs and forecasting marine climate and vertical garden agricultural development programs has decreased significantly in the last five years, namely 2015-2020. The budget for fishery production improvement and development programs in 2015-2016 has increased significantly, but for the following years, it tends to be dynamic. The same goes for the budget for quality improvement programs and hygiene products for fishery products.

Figure 2 shows that the budget for the food security improvement program is the highest for five years (2015-2020), namely 2016-2017. Food supply and production program budgeting have increased in 2017 and then has been constant in the 2018-2019 period and decreased drastically in 2020. The program of supervision and control of food safety initially increased in the 2015-2019 period then decreased in 2020. Meanwhile, the program budgeting insecurity in food distribution has not increased or tends to be constant. While figure 3 shows that the funding for the adaptation program at the Makassar City Public Works Office tends to fluctuate from 2015 to 2019.
Figure 1. Graph of Marine Fisheries, Agriculture and Livestock Budget.

Figure 2. Graph of Makassar city food security service funding budget.

Figure 3. Funding for the adaptation program at the Makassar City Public Works Office 2015 to 2019.
Figure 4. Financing climate change adaptation programs and global warming environmental agencies work Makassar.

Figure 4 shows budget funding for the adaptation program of the Makassar City Environment office shows that there has been a significant decrease in funding for solid waste and hazardous waste management performance development programs. Meanwhile, other programs tend to be constant.

Figure 5. Funding for the adaptation program of the Makassar City Spatial Planning Office.

Based on the funding chart for the adaptation program of the Makassar City Spatial Planning Office (figure 5), it is known that almost all programs have experienced a budget decline within five years.

Based on data on all climate change adaptation budget funds, it can be concluded that the budget allocation for climate change adaptation programs in Makassar City is increasingly experiencing uncertainty, this is because the program has not focused on the direction of adaptation but is still a routine government program in the framework of regional development plans so that the available budget has been allocated to focus on regional development. Therefore, government efforts are needed to focus on handling adaptation so that it can collaborate with international parties for funding assistance related to climate change adaptation programs.

2.4. Makassar City Government knowledge level on climate change and global warming

The results of the analysis of respondent data from each Makassar City government agency show that of all offices the highest level of knowledge about climate change and global warming is the Department of Marine, Fisheries, Agriculture and Animal Husbandry (DKP3) with the category of knowing enough, namely 11 respondents while 4 other respondents do not know enough. Meanwhile, the lowest level of knowledge about climate change and global warming is in the Regional House of Representatives where
the respondents in the less knowledgeable category are 14 respondents while the respondent category who knows enough is 1 respondent. So based on this graph, it can be concluded that the understanding of the Makassar City government regarding climate change and global warming is still very low.

As comparative data, the following is the level of knowledge of the Semarang City government agency regarding climate change adaptation [13] as shown in figure 7.

Based on this figure 7, it can be concluded that the level of knowledge of Semarang City government agencies is still low. So that when compared, the respondents in the scope of the government of Makassar City have a better understanding of the issue of climate change. This can be seen based on the frequency distribution of the level of knowledge on each graph where respondents with sufficient categories are more numerous than respondents in the Makassar City government.

3. Conclusions and suggestion
Based on the above discussion, it can be concluded that the most important aspect of an adaptation of the policy to climate change and global warming, namely coordination and interaction between institutions that do not work properly causes adaptation patterns that do not have the right direction and are inconsistent and this is also not supported by the pattern. Inconsistent budgeting that causes the strengthening of adaptation is not supported by an adequate budgeting system, this is also exacerbated by the low level of knowledge of policymakers, both the executive and the legislature on climate change and global warming, which in this case are elements that are quite important in the implementation and
the development of government efforts, especially the Makassar city government in adapting to climate change and global warming.

The suggestions that can be recommended for the adaptation of Makassar city government in this study are:

1. Direct handling of climate change adaptation needs to be mainstreamed in regional development planning starting at the city level.
2. It is very important to increase the capacity of institutions, institutions, and society so that the goals of climate change adaptation and global warming are more precisely targeted, especially in terms of coordination.
3. Researchers suggest conducting an in-depth study of the level of hazards and risks to sectors vulnerable to the impact of climate change.

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