Climate Village Program for Climate Change Adaptation and Mitigation for Green Villages

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Abstract. Climate change has become an issue that is hotly discussed by all countries in the world. Indonesia is included in it and has committed to adapt and mitigate this issue, and specifically set a target of reducing greenhouse gas emissions by 29% from business as usual levels. One of the priority areas for climate change adaptation and mitigation is Jambi Province. Floods and droughts are a few examples of the impacts of climate change. In addition, waste management and inaccurate waste are one of the factors that trigger climate change and public health problems. As an adaptation and mitigation effort on these problems, it is necessary to strengthen and disseminate community resilience to face climate change. Furthermore, community knowledge and skills capacity building for climate change adaptation and mitigation is carried out. Activities are carried out in efforts to adapt and mitigate climate change by holding several activities. These activities include socialization of strengthening community resilience to climate change, strengthening village policies in the context of climate change mitigation, mentoring and training in rainwater harvesting and water saving, tree planting and urban farming, and strengthening the concept of “zero waste” in waste or solid waste management. The purpose of these activities is to provide assistance and training to communities in Tangkit Village, Sungai Gelam District, Muaro Jambi Regency, Jambi Province to increase the capacity of knowledge and skills in adaptation and mitigation efforts to create a green village.

1. Introduction
One of the goals in the Sustainable Development Goals (SDGs) is climate action [1]. This effort is very important because it has a very big impact on human life and nature. Natural resources and environments are important sources of human life and other living things. However, in reality, there are still many human activities that contribute to accelerating climate change. Some examples of the activities referred to are a wasteful use of water and energy, as well as improper waste management.

One of the regions in Indonesia that has a tendency towards this in Jambi Province. Jambi area experiences frequent flooding and the impact of climate change. In addition, inaccurate waste management also triggers and accelerates climate change. Waste that is not managed properly will emit greenhouse gases (CH₄), which are as dangerous as carbon emissions. Efforts to overcome these problems cannot be separated from the community’s participation so that collective awareness needs to be built to overcome these things. Through increasing the capacity of community knowledge and skills, more optimal results will be obtained in accordance with the 13th SDGs indicator, namely capacity
building in planning and effective management of climate change in developing countries, with a focus on youth and local communities.

The extreme weather conditions that occur in Indonesia have caused farmers to experience crop failure due to drought and flooding. Farmers need knowledge and the ability to understand climate change in order to anticipate the impacts of climate change. They are fostering farmers to deal with climate change disasters through the existence of a knowledge house to form a climate village, as an effort to support the ProKlim program, which has been a program of the Ministry of Environment and Forestry since 2012. The ProKlim program is the implementation of the Paris Agreement, which the Government of Indonesia has ratified into Law No. 16 of 2016 concerning Approval, Paris to the United Nations Framework Convention on Climate Change. The legal basis for ProKlim is the Regulation of the Minister of Environment and Forestry Number: P.84/MenLHK-Setjen/Kum.1/11/2016 regarding the Climate Village Program, and has been followed up with the issuance of Regulation of the Director-General of Climate Change Control Number: P.1/PPI/SET/KUM.1/2/2017 concerning Guidelines for Implementing the Climate Village Program.

This climate-friendly village is important to develop as an effort to raise awareness, mitigate and reduce the impact of climate change from human activities that are not environmentally friendly. Prevention is the most effective way to deal with fires in the long term, and cooperation is needed to make this happen [2]. Forest fires that recur every year indicate that vulnerability to forest fires has increased over the past two decades and that prevention efforts have so far not been effective [3]. Prevention of land/forest fires that occur must begin with a more anticipatory and systematic approach. Through this, more optimal results will be obtained in accordance with the 13th SDGs indicator, namely increasing capacity for planning and management related to climate change.

So, to improve the community's ability to mitigate efforts, it is necessary to hold community service activities in the form of education to improve the mitigation capacity of residents in facing climate change. It also in the form of greening and cleaning efforts to control drought, floods, and landslides; control of climate-related diseases; waste management, solid and liquid waste; agricultural cultivation; as well as prevention and control of forest and land fires. Mitigation is an effort to reduce the risk of disasters due to climate change by increasing greenhouse gas emissions, both through physical development as well as awareness and increased capacity to face disaster threats [4].

Human intervention is needed in an effort to improve environmental conditions damaged by human activities. Rehabilitation efforts that can be done are through education to the community to increase their knowledge and skills. Through this, the results will be obtained that the community will have independence in environmental management, especially to realize climate change adaptation and mitigation. Through rainwater harvesting, saving water use and proper waste management will lead to a better condition. If these things are successfully carried out, of course, the 13th SDGs' goals will be realized so that environmental and social sustainability can also be achieved.

Sungai Gelam District is one of the areas in Muaro Jambi Regency, Jambi Province, with abundant natural resources. Most of Sungai Gelam's agricultural commodities come from oil palm, so it is not surprising that the area of oil palm land in Sungai Subdistrict has increased significantly, from only 1,124 ha in 2018 to 7,046 ha in 2019 [5]. Apart from oil palm, the people of Sungai Gelam also plant rubber, cocoa, areca nut, and coconut trees, as well as raise cattle, buffalo, goats, sheep, pigs, chickens, and ducks as their source of income [6]. The promising economic value of these commodities has made the people of Sungai Gelam continue to strive to extend agricultural and livestock production to increase income, including the people of Tangkit Village, whose areas have begun to shift functions from forests to plantations or livestock.

Tangkit Village is one of 15 villages in Sungai Gelam District, Muaro Jambi Regency, with about 2,900 hectares area and has a population of around 10,550 people [6]. The area of Tangkit Village is directly adjacent to Jambi City in its western part, where the city is the center point of the eastern and western Sumatra highway, making it one of the centers of regional economic growth. Its strategic location has the potential to increase land extension efforts that could threaten environmental sustainability and accelerate the impact of climate change.
2. Method
In general, the method used is to provide assistance and training to communities in Tangkit Village, Sungai Gelam District, Muaro Jambi Regency, Jambi Province to increase the capacity of knowledge and adaptation skills and mitigation efforts to climate change to create a green village. This activity will begin with a Focus Group Discussion (FGD) in three stages, namely analyzing the current condition of the Tangkit Village community, determining a gap analysis, and knowing the community.

3. Results and discussion
During 2007-2016, human activities contributed to 23% of the world's total human-derived emissions with a composition of 13% CO$_2$, 44% Methane (CH$_4$), 81% Nitrous oxide (N$_2$O) [7]. Emissions from human activities also contribute to global warming, which is expected to continue to increase between 1.5-2°C over the next two to three decades [8]. This will impact climate change, which can lead to natural disasters, such as floods and drought. Based on observations in the field, this community service program becomes important based on several problems, namely:

1. The increase in natural disasters due to extreme climate change in the last five years, in the form of floods, drought, or landslides due to changes in the frequency of frequent rains.
2. Temperature changes are getting hotter, causing the emergence of many diseases. Apart from dehydration, there has also been an increase in people suffering from diarrhea and DHF / DB, as well as ARI (upper respiratory tract infection) due to air pollution.
3. The pattern of environmental management is still done partially, not integrated, and not community-based. Likewise, waste management is still limited to sorting out waste products that are economically beneficial (with the existence of a waste bank). However, waste that has no value is still not well managed.
4. Other environmental management, such as land conservation, has not been carried out by community members by exploring local wisdom.

This program's priority is guidance to farmers due to limited empowerment and more intensive guidance to society. It is hoped that the benefits obtained include economic, social, and environmental aspects. In the economic aspect, the ability to carry out conservation, reforestation, and agricultural cultivation will increase income. In the environmental aspect, it is hoped that environmental health can be realized with clean, green, comfortable, and healthy community conditions to reduce the impact of climate change. As for the social aspect, the existence of a "knowledge house" will strengthen social cohesion for residents' existence in the community.

The exploitation of land and forests is still an environmental problem that most often occurs in Jambi Province, either through illegal logging or fire. In general, this is aimed at opening new plantation /
agricultural land, such as in Sungai Gelam District, which expanded its oil palm plantation area from 1,124 ha in 2018 to 7,046 ha in 2019. Throughout 2019, Jambi Province experienced forest fires covering 157,137 ha and causing environmental losses of IDR 12 trillion [9]. The area of the Jambi Province forest fires in 2019 was larger than in 2015 when massive forest fires also occurred and devoured approximately 123,000 ha of forest land in Jambi Province, with total losses due to haze estimated at Rp. 11.8 trillion or 857 million USD [10].

In the World Bank report in The Cost of Fire: An Economic Analysis of Indonesia's 2015 Fire Crisis (2016), it is explained in sufficient detail the economic losses resulting from forest fires that occurred in Jambi Province in 2015, as can be seen in Figure 2

![Figure 2](attachment:figure2.png)

*Figure 2. Estimated losses from forest fires in Jambi Province (million USD) [11]*

Based on the graph above, losses due to forest fires in Jambi impact the environment, related to the loss of biodiversity and the emergence of massive carbon emissions, followed by losses in the agricultural sector. Carbon emissions from forest fires scattered in large quantities will ultimately impact climate change, which can disrupt ecosystems [12]. This, in the end, disrupts the lives of the residents of Tangkit Village who are experiencing long drought and lack of clean water as a result of climate change in 2019 [13].

Apart from illegal logging and forest fires, inappropriate waste management can also trigger and accelerate the rate of climate change. Waste that is not managed properly can emit greenhouse gases (CH₄), which will contribute to climate change [14]. For example, the rubbish in the Angso Duo and Talang Banjar markets, in one of the sub-districts in Muaro Jambi Regency, is managed by collecting garbage in the garbage bins that have been provided. It is then dumping it into a landfill (TPA) at TPA Talang Gulo without further processing. The same thing also happened in Tangkit Village, which still relied on the collect-transport-waste scheme in managing waste in its environment [15].

### 4. Conclusion

Losses due to forest fires in Jambi have the most impact on the environment, related to the loss of biodiversity and the emergence of massive carbon emissions, followed by losses in the agricultural sector. Apart from illegal logging and forest fires, inappropriate waste management can also trigger and accelerate the rate of climate change. The unmanaged waste, especially organic waste, will emit greenhouse gases and contribute to the acceleration of the rate of climate change. Because of that, the socialization of strengthening community resilience to climate change, strengthening village policies in the context of climate change mitigation, mentoring and training in rainwater harvesting and water saving, tree planting and urban farming, and strengthening the concept of "zero waste" in waste or solid
waste management is important. The activities provide assistance and training to communities, especially in Tangkit Village, Sungai Gelam District, Muaro Jambi Regency, Jambi Province, to increase knowledge and skills in adaptation and mitigation efforts. That to create a green village will strengthen community resilience to climate change.

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References
[1] INFID 2015. Laporan Publik INFID 2015. https://infid.org/id/news/read/laporan-publik-2015
[2] UNDP 2015 *After the Rains Start: Moving Toward Long-Term Peat and Forest Fire Prevention*. https://www.id.undp.org/content/indonesia/en/home/library/environment_energy/after-the-rain-starts.html
[3] Saharjo B H, Syaufina L, Nurhayati A D, Putra E I, Waldi R D, and Wardana 2018 *Pengendalian Kebakaran Hutan dan Lahan: di Wilayah Komunitas Terdampak Asap*, ed A D Gumelar (Bogor: IPB Press)
[4] Law No. 24 of 2007 on Disaster Management).
[5] BPS Kabupaten Muaro Jambi 2020 *Kabupaten Muaro Jambi dalam Angka 2020* (Muaro Jambi)
[6] BPS Kabupaten Muaro Jambi 2019 *Kecamatan Sungai Gelam dalam Angka 2019* (Muaro Jambi)
[7] IPCC 2019 Summary for Policymakers *Climate Change and Land: an IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems* ed P R Shukla, J Skea, E Calvo Buendia, V Masson-Delmotte, H -O Pörtner, D C Roberts, P Zhai, R Slade, S Connors, R van Diemen, M Ferrat, E Haughey, S Luz, S Neogi, M Pathak, J Petzold, J Portugal Pereira, P Vyas, E Huntley, K Kissick, M Belkacemi, J Malley
[8] IPCC 2018 Summary for Policymakers *Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change* ed V Masson-Delmotte, P Zhai, H -O Pörtner, D Roberts, J Skea, P R Shukla, A Pirani, W Moufouma-Oka, C Pêan, R Picock, S Connors, J B R Matthews, Y Chen, X Zhou, M I Gomis, E Lonnoy, T Maycock, M Tignor, and T Waterfield (Geneva, Switzerland: World Meteorological Organization) pp 32
[9] Sekoja 2019 *Aktivitas Ilegal Rusak Alam Jambi, Negara Disebut Rugi Rp 17 Triliun* Sekoja.com
[10] Roza A M 2015 Rp 221 Triliun Kerugian Akibat Kebakaran Hutan www.katadata.com
[11] World Bank 2016 *The Cost of Fire: An Economic Analysis of Indonesia’s 2015 Fire Crisis* (Jakarta)
[12] United Nations 2019 *Report of the Secretary-General on the 2019 Climate Action Summit and the Way Forward in 2020*
[13] Gatra 2019 *Sumur Warga Tangkit Kekeringan, Polisi Salurkan Air Bersih* www.gatra.com
[14] Fahri I, Kurnain A, Mahyudin R P, and Ferrianta Y 2019 Analisis Reduksi Emisi Gas Rumah Kaca Dari Pengelolaan Sampah Padat Di Kecamatan Marabahan Kabupaten Barito Kuala Provinsi Kalimantan Selatan *EnviroScienteae* 15 43–9
[15] Sutrisno, Nelson, and Sumarsono T 2015 *Pengolahan Sampah Organik Pasar Angso Duo Jambi Menjadi Biogas Bagi Masyarakat Sekitar* *Jurnal Pengabdian Pada Masyarakat* 30 53–7