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Adaptation and Mitigation on Climate Change Through Collaboration Between Local Municipal and Community Participation in DKI Jakarta

Francis Yolanda[1], Rita[3], Citra[3], Frieda Hariyani[1], Firdhan Aria Wijaya[2], and Novrizal[1]

[1]Research Institute of Human Settlements, Ministry of Public Works and Housing, West Java, Republic of Indonesia
[2]Center for Cultural Studies, Gadjah Mada University, Yogyakarta, Republic of Indonesia
[3]People Participation Unit, Environmental Division, DKI Jakarta Province, Republic of Indonesia

Abstract

An anthropogenic and natural cause has contributed significantly to the increases in temperature globally. A wide range of actions from institutional and social level can be done as the response to these changes. This study explores the ability of adaptation and mitigation in terms of governmental-social-ecological using lessons from the specific case study. As a metropolitan city, Jakarta is examined as one of the most vulnerable cities to climate change risk. By using observation approach through the interview, this case study focuses on climate village program which integrated the participation of people who reside in Jakarta and local government effort, as a domestic part in term of supporting green gas emission reduction.

Keywords: climate change, adaptation, mitigation

Corresponding Author:
Francis Yolanda

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1. Introduction

Climate change has become a real environmental phenomenon and is recognized as one of the most significant threats in recent human history because of urbanization to some extent influences the number of disasters [1]. This warming climate condition happens due to the accumulation of greenhouse gases (GHG) in the atmosphere. Inevitable human activities in later economic development (include fossil fuels usage, decomposition process of solid-waste and liquid-waste, chemical utilization in agriculture, and firing agricultural residue) contributed in increasing the atmospheric concentration of greenhouse gases. It could be worse also by deforestation and degradation of land which eradicate the forest's ability to absorb CO2. Consequently, climate change is likely to raise the intensity and magnitude of some weather events and disasters such as floods,

landslides, drought, crop failure, biodiversity loss, sea level rise and human health [3]. Therefore, the real action is needed to increase community resilience to climate change impacts and reduce GHG emissions, as a necessary part of sustainable development [2]. Local Action Strengthening [4] in Climate Village Program (*CVP*) is a nationwide scheme that is developed by the Ministry of Environment Indonesia to encourage local communities and all stakeholders in implementing local actions to improve resilience to climate change impacts and reducing GHG emissions. Through the implementation of *CVP*, every municipal rewards their own communities that have been implementing climate change adaptation and mitigation in a sustainable way. The implementation of *CVP* refers to the Regulation of the Minister of Environment No. 19/2012. *CVP* can be implemented at the minimum level of Dusun/Dukuh/RW and equivalent to rural government or village level. Climate change adaptation and mitigation that measures at *CVP* sites can be:

1. controling of drought, flood, and landslide;
2. increasing food security;
3. managing of climate-related diseases;
4. handling or anticipating sea level rise, rob, sea water intrusion, abrasion, ablation or erosion due to the wind, high waves;
5. managing solid-waste and liquid waste;
6. utilising waste-water disposal;
7. using new renewable energy, conserving and saving energy;
8. cultivating agricultural plants;
9. increasing vegetation cover; and
10. preventing and controling of degradation dan deforestation and land fires.

The Ministry of the Environment through the Directorate General of Climate Change Control received the proposed location for *CVP* award based on the qualitative evaluation that local action on adaptation and mitigation has been done (Directorate of Climate Change Adaptation, proklim.klh@gmail.com).

In DKI Jakarta, *CVP* has been conducted from 2014. Local community in DKI Jakarta has been working to reduce the impact of climate change through adaptation and mitigation efforts. *CVP* generated some regions that made efforts to adapt and minimize

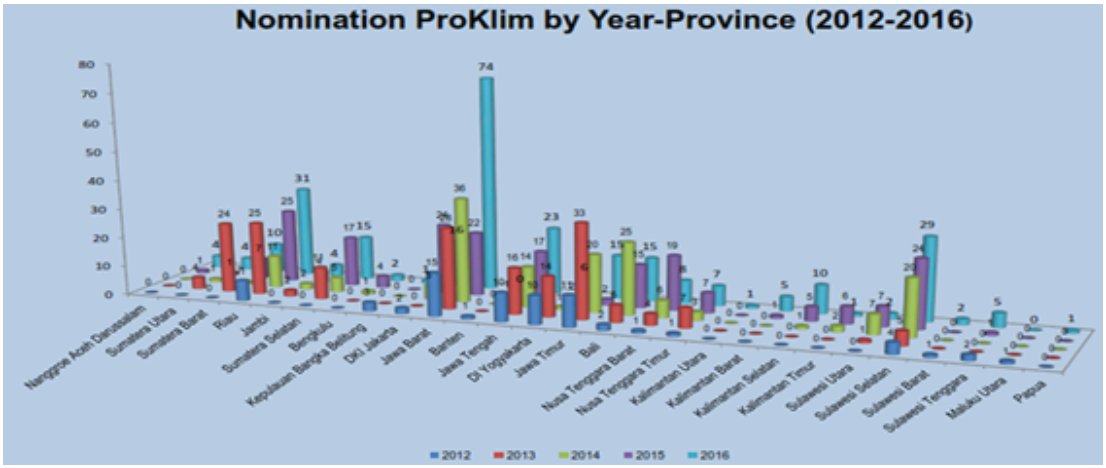


Figure 1: Nomination *CVP* (Pogram Kampung Iklim / ProKlim) by Year-Province 2012-2016 [9].

Figure 2: Suggestion Map of Proposed *CVP* Location 2012-2017 [9].

the risks of climate change, including health issue, food security, solid-waste and liquid-waste management, water supply and disaster control.

The assessment of mitigation and adaptation efforts is made through observations on some community representatives. Representatives from each location fill in the data and verified by surveyor. Verification of data is the establishment of theory, facts, etc. Survey includes verification of observations' results from real efforts in adaptation actions, mitigation actions and institutional data.

The purpose of the *CVP* Implementation activities are as follows [5]:

1. Contribute to address global climate change, including greenhouse gasses (GHG) emission reduction target either nationally or regionally;
2. Improve community resilience facing climate variability and the impacts of climate change;
3. Give the information on climate change mitigation and adaptation activities and local development potentials to be input into policy formulation, strategies and programs related to climate change.

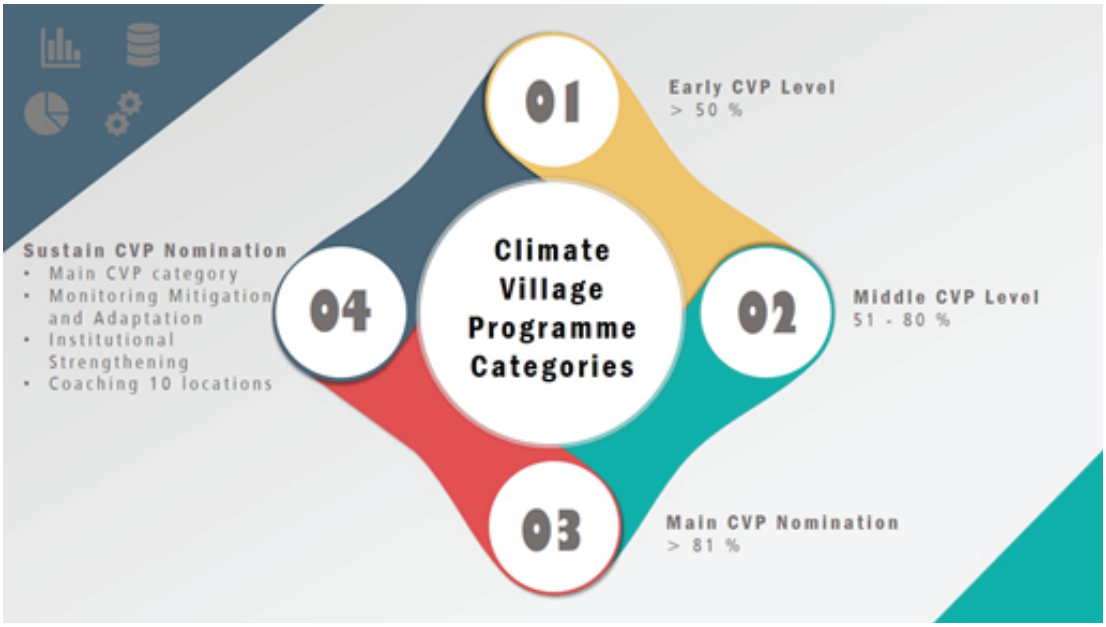


Figure 3: *CVP* Categories [10].

Figure 4: Road Map of Target Achievement and CVP Goals 2030 [10].

CVP has been implemented since 2012 in Indonesia, while DKI Jakarta Province has just participated in implementing *CVP* in 2014 and 2015. In 2014, there are 5 CVP sites in Jakarta, and it has increased to 22 locations in 2016. From all *CVP* locations in 2016, there are various water sources of residents, ranging from 100% of people using PAM water, 100% shallow groundwater, plus some residents use shallow water and PAM water. In addition, there are also areas where citizens use deep groundwater. From

areas that use PAM water, two sites choose to use PAM because the shallow well water is poor so it is only used for watering plants and not for consumption. All locations have never experienced water shortage, but there is one area, namely Jati Padang, there are restrictions on the use of water because the source of water comes from the communal well water drill.

Some of *CVP* areas utilize reused water and rainwater for washing or watering their plants. it has been done in several proposed areas of *CVP*, namely in RW 01 Cikini, RW 05 Mampang Prapatan, RW 07 Kebayoran lama Selatan, RW 01 Sunter Jaya, RW 04 Bambu Apus, and RW 05 Pulau Pramuka. In Sunter Jaya urban village and Kebayoran Lama Selatan the remaining washing water is used to water the plants. Other areas use rainwater, accommodated to clean the floors and water the plants.

In the proposed area of the *CVP*, out of all locations only six sites were never flooded (only a major flood in 2007). There are four locations affected by the flood but only limited inundation during heavy rains. Floods that occur not only the flood caused by overflow of rivers, but also floods that are affected by the rise of sea water during the full moon, that is in Pramuka Island. The community has overcome this flood with the elevation of buildings in Cempaka Putih Timur, Pertukangan Selatan, Kampung Baru, and Pramuka Island. In addition, to overcome the puddle is done pumping inundation by using water pump from Fire Brigade. At the proposed location of *CVP* not many locations contained absorption wells, there are only seven areas that have absorption wells.

2. Method

2.1. Work scheme

The scope of *CVP* activities include:

1. Identify climate change mitigation and adaptation actions in several locations;

   Identification of RW-level community groups in DKI Jakarta amounted sites that have been active in mitigation and adaptation actions. Mitigation include actions to reduce the amount of GHG emissions from waste management activities, planting trees/parks, biogas, etc. Adaptation actions include activities to increase community resilience from climate change impacts such as water resources management, food security, health promotion, local drainage management, etc.

2. Verify data and field;

Verification includes field review activities to calculate the level of adaptation and mitigation that has been done by all *CVP* location candidates. Highlight the potential findings for further engagement by community opinion leaders in governance processes for responding to sustainability issues such as climate change [6] because more work is needed to connect networks knowledgeable about projected climate change impacts (e.g. government and research organizations) with local networks of community opinion leaders.

3. Evaluation and monitoring the results of activities.

   Evaluation and monitoring the results of the implementation of activities include monitoring activities on the process of submitting *CVP* location, verification process, and the announcement of assessment result from the Ministry. The assessment of mitigation and adaptation efforts are made through observations of some community representatives. Head of each *CVP* was being interviewed to get qualitative data and verified by surveyor. Survey includes verification of observations' results from real efforts in adaptation actions, mitigation actions and institutional data.

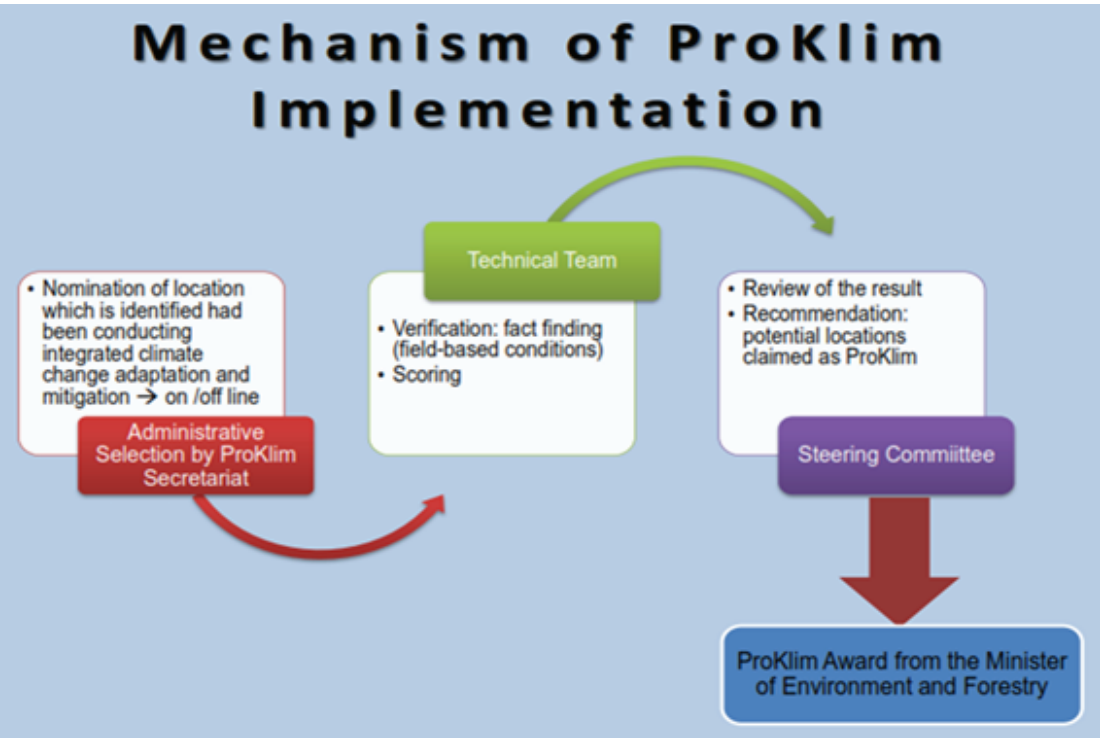


Figure 5: Climate Village Program Implementation Mechanism [9].

Activities of *CVP* 2016 has main aim to assess all locations in 5 administrative cities and 1 district of DKI Jakarta by using verifiable form by surveyor and verifier team.

The objective is to create a community that understands climate change issues and its impacts and to engage in proactive climate adaptation and mitigation actions that contribute to the achievement of sustainable national development.

One aspect of *CVP*'s implementation is inseparable from the role of the community or the institution that governs the local to be consistent in performing its functions and duties in the activities of *CVP*. In relation to this matter, institutional in all CVP locations registered in DKI Jakarta have been evaluated to know how far the institutional role of every locations to support the activities of *CVP*.

3. Results

The results from observation of the efforts of citizens to participate in the CVP are as follows:

3.1. Waste management activities

From the 22 proclaimed locations, there are six locations do not have a waste bank. Two locations, namely in RW 03 Munjul and RW 12 Kebon Kosong, there was once a waste bank (3R) but no longer functions due to land issues and change of management. This can be overcome by replacing the waste bank land, for example, the location of the TPS or the residents' house are made close. A waste bank that is pioneered can be a gathering station. Residents collect recyclables that can be sold on a certain day and immediately at the waste bank. Lack of public participation in the activities of waste banks can be overcome by socialization to other citizens.

The method of segregating waste at *CVP* locations varies from what officers has been done, segregation by residents at their home, to citizens who do nothing. Some residents did 3R (reuse, reduce, recycle) who sort out garbage at home make compost in household scale, or bring organic waste to a communal composter. Residual waste is brought by the TPS officer. There is sorting and recycling activities at home or composting at several locations, namely in Cempaka Putih Barat, Mampang Prapatan, Kebayoran Lama Selatan, and Ciracas. For locations that do not yet have a waste bank, the sorting is done by officers and garbage collectors at TPS. However, in some locations such as in Sungai Bambu Village there are residents who segregate garbage independently, then sell the garbage that can still be recycled to the collectors.

There are factors influencing community participation in improving the quality of the environment i.e income; infrastructure; perception of environmental quality; the role

of community leaders; motivation and number of family members; level of revenue directly and indirectly affects shape of community partisans; facilities directly and indirectly; the role of public figures directly and indirectly; the number of families directly and indirectly; perceptions about the environmental quality by residence are indirectly and directly to the form of participation; motivation affects directly and indirectly to form part of social participation in developing environmental quality.

3.2. Greenery activities

3.2.1. Greenery activities

In *CVP* locations, greening and cultivation of food crops are hampered by lack of sufficient land. From all locations, community land for greenery is available in 10 locations, 12 other locations have limited land because the location is a densely populated area. Unavailability of land in some locations is tricked by residents by planting crops in pots, polybags, verticulture, and also hydroponics.

Society is the key to success of greenery activities. Greenery activities to keep the environmental quality from being degraded require active participation community. Without the active participation of the community, the success rate of greenery activities will be low. One of the efforts to attract community awareness and involvement in greening activities is to pay attention to the benefits of greening crops. What is meant by the principle of this benefit is to choose plants that have the potential to generate economic value added for the community. For example coffee plants. This plant can be harvested in addition to other crops, also potentially produce coffee beans that can be sold so as to increase people's income.

Community participation varies in greening. Some of the location, participation in greening is done by all citizens, Empowerment Family Welfare (Pemberdayaan Kesejahteraan Keluarga/PKK), Local Cleaning & Gardening Service (Dinas Kebersihan Pertamanan/DKP), and Citizens Assocation (Rukun Warga/RW). In addition, there is also an environmental community as well as CSR participate in greening activities in the environment.

A. Community institution

Waste Bank is a community institution that covers waste management activities for residents. Most of the proposed *CVP* locations have waste bank managed by officers

and citizens. The location of the *CVP* proposal that does not have a garbage bank is Cikini RW 03 and RW 01, Cempaka Putih Barat RW 10, Kebon Kosong RW 12, Sungai Bambu RW 04, and Munjul RW 03. The presence of waste bank in *CVP* proposal location can increase community participation in manage waste. In addition to accommodating the waste that has been separated by the residents, some waste banks also facilitate recycling activities initiated by PKK. Community participation includes being active in sorting and waste collection to Waste Bank. Compared to locations that do not have a waste bank, the segregation of waste carried out by citizens is lower. However, there are several locations that sort waste and sell it to collectors even though there are no waste banks such as in Bamboo RW 04 and Cempaka Putih Barat RW 10.

Some locations once have a waste bank, including Kebon Kosong RW 12 and Munjul RW 03. This is because there is no land and clarity of local waste bank management. Higher community participation also resulted in the waste bank no longer functioning. Need socialization to the citizens and coaching in running the waste bank. In other locations that have administrators and fixed locations, and supported by good community participation, waste banks can run well and waste management activities can run optimally. Examples of waste banks that have been operating with good management are in Jati Urban Village RW 07 and Bumi Pesanggrahan RW 08.

Institutions that oversee community participation in other environmental management activities include the PKK. In addition to PKK, there are also community organizations / institutions engaged in the field of farming such as a combination of farmer groups, and seedlings. The institute seeks greening in the environment with food crops such as vegetables and fruits.

In recycling activities, besides PKK and Garbage Bank there are also some other institutions such as Forum Hijau in Pramuka Island. Community participation that follows this community is quite high in all locations of *CVP* proposals.

The role of other community institutions is the local RT and RW. Many efforts are initiated by RT and RW in order to manage a good environment. One of his efforts is to mobilize people to save electricity, save water, and dispose of waste in place. In addition, RT and RW also have regular work programs every month to maintain the quality of the environment. As in some locations prone to puddles, the culvert is cleaned by the residents every month to keep no water puddles.

Efforts to save electricity, save water, and dispose of waste in place done with the holding of socialization to the citizens. In addition, calls for environmental love and smoking bans in some areas are also installed in some areas such as Bambu Apus and Munjul areas.

B. Third party support

In Indonesia, CSR is a mandatory program implemented by the company. There are several legal grounds such as Article 74 of Law No. 40 of 2007 on Limited Liability Companies, Articles 15n and 15d of Law No. 25 of 2007 on Capital Investment, and Article 2e of Law No. 19 of 2003 on Business Entities State property. Several articles in the regulation clearly stated that the company has a responsibility to play a role in creating community welfare. This regulation is a form of government intervention to companies to jointly help create a more prosperous society. At *CVP* locations, there are several locations that receive CSR funding for some of its activities, including for waste bank, environmentally friendly toilet technology from Japan, health facilities, and composting facilities.

CSR from Daihatsu Astra (Astra Honda Motor/AHM) provides assistance in the form of ambulance for Bambu Apus Village, Bazis provides healthy house assistance, PT Bintang Toedjoh provides herbal plant assistance, and PLN provides compost donation. From the government also provide assistance to the community such as biopore tools from the village, as well as the assistance of agriculture for hidroponic. Assistance from overseas is also accepted by Pramuka Island for the marketing of handicrafts abroad (the Netherlands).

Figure 6: Third Party Support by AHM Tbk [3].

4. Discussion

To deliver the results of the survey and verification of *CVP* location, on August 2016, a meeting was held in Jakarta on BPLHD People Participation division by inviting KPLH (board of environmental evaluators) Jakarta and representatives from *CVP* proposed region. Regional representatives who came, are from:

1. Pertukangan Selatan Village;
2. Kelurahan Baru Village;
3. Mampang Prapatan Village;
4. Bambu Apus Village;
5. Kramat Jati Village;
6. Kebayoran Lama Selatan Village;
7. Joglo Village;
8. Sunter Jaya Village;
9. Cempaka Putih Timur Village;
10. Cakung Barat Village;
11. Cikini Village;
12. Munjul Village.

Prior to the evaluation by the *CVP* team, the selected regions were sent an excel to fill the activities related to *CVP*, including the aspects of adaptation-mitigation and institutions. The meeting outlines survey results by surveyors and the delivery of value by region and provides advice on measures to be taken by the region in order to improve the quality of the environment. There are inputs for BPLHD DKI Jakarta, such as the need for socialization and coordination from the center to the residents to fill excel so much data that does not represent what is in the field. In addition, the source when visited by the surveyor team is not the same as that fill the excel so that there is an inappropriate delivery of data between those filled in excel and resource persons.

The follow-up of the *CVP* did not stop until the discussion of the final survey results. Submission of suggestions per region is used as a consideration for better environmental management. Location *CVP* Bambu Apus one of them, has been coordinating to residents and janitors to improve the environment.

This area disseminates the verification result delivered in BPLHD DKI Jakarta to the residents. In addition to socialization, discussed also aspects that are included in the suggestion. This location has been done to repair the biopore hole by utilizing plastic bottle waste as cover for safe, also done *Jumantik* as well as socialization of *CVP*. This location has a target to form 1000 biopore holes. At the end of August 2016, 786 biopore holes have been formed. In addition to making biopore holes, mass community work by the residents are also done, assisted by local PPSU. In addition to cleaning the area, Waste Bank for waste recycling management is also optimized for its function.

DKI Jakarta Provincial Government has issued Instruction of Governor of DKI Jakarta Province No. 91 of 2016 concerning Proklim Location Guidance and Assistance [8] i.e:

1. Regulate the role of the relevant Provincial Division to synergize the program according to its main tasks and functions at the CVP location.
2. The mechanism for proposing CVP to the national level: Urban Village Head (Lurah) → Subdistrict Head (Camat) → Mayor (Walikota) → Environmental Service (Dinas Lingkungan Hidup/DLH) → Ministry of Environment and Forestry (Kementerian Lingkungan Hidup dan Kehutanan/KLHK).
3. Target for every village in DKI Jakarta must have at least 1 (one) CVP location at RW level.

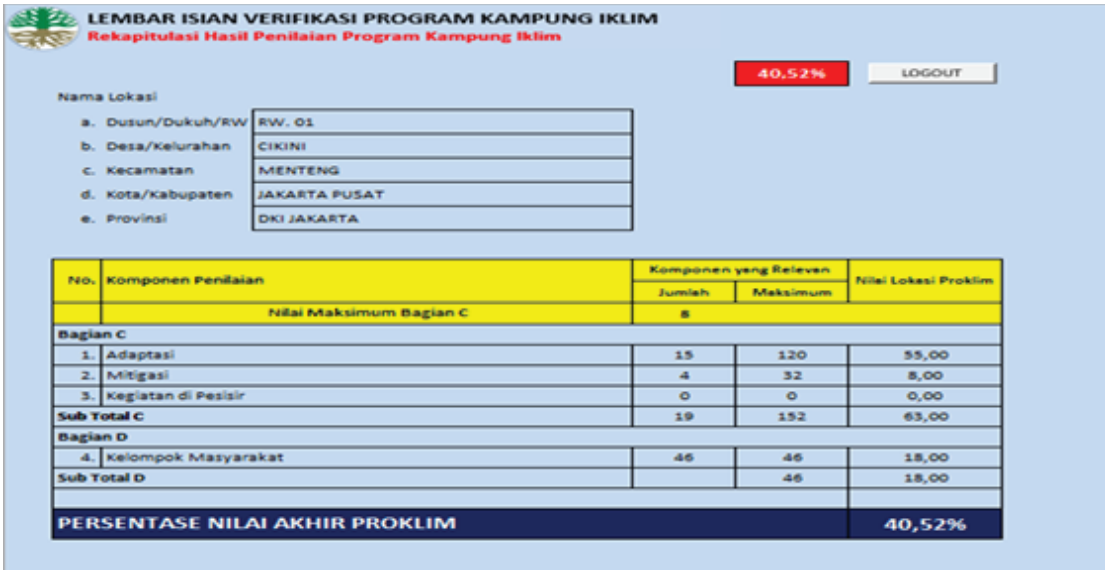
Achievements of DKI Jakarta *CVP* are, with number of proposals to national level:

- In 2014 = 5 locations
- In 2015 = 12 locations
- In 2016 = 16 locations

The proposals for the 2017 climate program from 5 regions are 277 locations including Kepulauan Seribu. We include 3 data from KLHK in Figure 7, 8 and 9 to describe few detils in CVP document works.

5. Conclusion

Climate Village Program is one of the local projects from the Ministry of Environment and Forestry. DKI Jakarta has participated in *CVP* since 2012. In the journey of *CVP*, the government of DKI Jakarta takes part in the development of Climate Village which already exist. In addition, verification from Ministry was also accompanied by BPLHD DKI Jakarta. Meetings with citizens to socialize the *CVP* were also conducted in several



LEMBAR ISIAN VERIFIKASI PROGRAM KAMPUNG IKLIM

Rekapitulasi Hasil Penilaian Program Kampung Iklim

40,52% LOGOUT

Nama Lokasi

a.	Dusun/Dukuh/RW	RW. 01
b.	Desa/Kelurahan	CIKINI
c.	Kecamatan	MENTENG
d.	Kota/Kabupaten	JAKARTA PUSAT
e.	Provinsi	DKI JAKARTA

No.	Komponen Penilaian	Komponen yang Relevan		Nilai Lokasi Proklim
		Jumlah	Maksimum	
	Nilai Maksimum Bagian C	8		
Bagian C				
1.	Adaptasi	15	120	55,00
2.	Mitigasi	4	32	8,00
3.	Kegiatan di Pesisir	0	0	0,00
Sub Total C		19	152	63,00
Bagian D				
4.	Kelompok Masyarakat	46	46	18,00
Sub Total D			46	18,00
PERSENTASE NILAI AKHIR PROKLIM				40,52%

Figure 7: Scoring Verification after Survey and Interview from Cikini Village.

SKPD : ENVIRONMENTAL DIVISION, DKI JAKARTA PROVINCE

DATA : GREENHOUSE GAS EMISSIONS from ENERGY SECTOR (million ton CO2-eq)

YEAR : 2010-2015

No	Categories	Direct Emission of Greenhouse Gas (mil ton CO2-eq)				
		2010	2011	2012	2013	2014
1	Energy Industries Emissions	7919	7698	6685	6352	6047
2	Manufacture Industries Emissions	2923	2769	2629	3213	2456
3	Transportation Emissions	7735	8517	10934	13727	13261
4	Commercial Building Emissions	146	146	274	399	61
5	Households Emissions	4782	5172	5655	5829	1449
6	Construction Projects Emissions	168	169	169	169	169
7	Oil Offshores & Gas Refineries Emissions	128	141	121	136	126
	Total Energy Sector	23801	24612	26467	29825	23569

Figure 8: GHG emission calculated from DKI Jakarta Region [8].

SKPD : ENVIRONMENTAL DIVISION, DKI JAKARTA PROVINCE

DATA : REDUCTION OF GREENHOUSE GAS EMISSIONS, DKI JAKARTA PROVINCE, ENERGY SECTOR

YEAR : 2016

No	Mitigation Action	Before 2014	Calculation Results		
			Category 1	Category 2	Category 3
		ton CO2e	ton CO2e	ton CO2e	ton CO2e
1	PJU LHE	11556	20314	0	0
2	PJU PLTS	10	10	0	0
3	PLTS Building	80	88	0	0
4	PLTS P. Seribu	62	60	0	0
5	Energy Efficiency	32446	0	0	35831
6	Green Builiding & Commercial	11913	35293	0	0
	Total	56067	55765	0	35831

Figure 9: Reduction of GHG emission in DKI Jakarta Region [8].

areas. The final meeting as the delivery of information on the results of the verification and scoring of the region has also been carried out at the end of the *CVP* Assessment period.

From the meeting of the proposed *CVP* area with the BPLHD of DKI Jakarta, as well as the re-guidance of the previous year's *CVP* location, it can launch citizen communication with the local government in order to improve the environmental quality. From *CVP* 2016, it is known that some mitigation adaptation efforts and local community contribution in maintaining environmental stability include maintaining water availability by means of water conservation using absorption wells, biopore infiltration holes, retention basins and rainwater storage systems. Water reuse is also done in some areas for savings. Also efforts to overcome the flood disaster by raising the building, making embankments, until the normalization of the river. In addition to the disaster response community, then there are early warning and preparation of evacuation routes. The majority of community opinion leaders interviewed were not strategically engaged with responding to climate change [6]. Reducing emissions to meet Indonesia's conditional target of a 41 percent reduction below business-as-usual levels would require even stronger efforts, include extending the country's forest moratorium, restoring degraded peatland, implementing energy conservation programs, and pursuing mitigation measures for other sectors and gases [7].

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