



KEMENTERIAN PERENCANAAN PEMBANGUNAN NASIONAL /
BADAN PERENCANAAN PEMBANGUNAN NASIONAL (BAPPENAS)



LEARN ABOUT CLIMATE CHANGE FROM SMALL THINGS

ICCTF Small Grant
Project 2014





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Assalamualaikum Wr. Wb.,

It has been recognized lately that issues on climate change have become essential in our development. In every international forum, climate change always becomes topic of discussion due to its global impact towards the economic development, social development and cultural development. In implementing the commitment of Government of Indonesia in mitigation, which is to reduce Greenhouse Gasses emission up to 26% using our independent capacity and up to 41% with international support, since 2009 we implement it through ICCTF's projects and programs by involving ministries in line, CSOs and Universities. Meanwhile, to reduce the risks and to improve the communities' ability to adapt in order to realize a strong community order in facing climate change, we have composed our adaptation programs in such a way that the impact of the programs can be directly perceived by the communities.

I thank God for helping us to successfully finish 6 (six) of ICCTF's Small Grant Programs in 2014. 3 (three) mitigation programs and 3 (three) adaptation programs which are funded by ICCTF for this year show how serious we are

in balancing mitigation programs with adaptation programs. I would like to congrats and thank all tenders from Politeknik ATMI Surakarta with its energy efficiency program, Faculty of Forestry of IPB and Arupa with conservation forest and community forest based mitigation, and Humanities Foundation with new method on resistant to extreme weather seaweed cultivation, and the weather informing program for farmers and fishermen from *Perkumpulan Pikul dan Bingkai Indonesia*.

All innovations and strategies from the 6 Small Grant Programs funded by us in this year will mean nothing if the lessons learned cannot be delivered to other parties. For that reason, we create this 2014 ICCTF Small Grant Programs Learning book. We hope this book will inspire other parties to participate, synergize and collaborate with us in activities related to climate change. We are aware that this book is not perfect, therefore, any positive corrections and comments are needed. At the end, this simple book cannot be finished without supports from other parties. Hopefully this book can give a concrete contribution towards Indonesia development in the future.

Jakarta, 10 February 2014

Ir. Wahyuningsih Darajati, M. Sc.



Delayed Logging,
Increase Carbon
Sequestration in
Community Forest

Delayed Logging, Increase Carbon Sequestration in Community Forest

Project ICCTF-Aliansi Relawan untuk
Penyelamatan Alam (ARUPA)

Summary

Residents of Terong Village, who joined the Jasema Forest Farmers Group shows, when the economical demands can be met without destroying forest, the carbon stocks can rise rapidly. The key is a complete understanding and the availability of a support system to implement a sustainable economic system.

Planting activities on the people's land that took place since the 70s, have managed to reforest an area of 2.6 million hectares. The community forest region is estimated to be able to store up to 40.7 million tons of carbon. But the challenge on the existence of community forests is also large: unplanned logging activity and land use conversion.

The ICCTF-Arupa project aims to: (1) increase carbon stocks in community forests, (2) increase the role of community forests in mitigating climate change and global warming. Achievements of this project: (1) Balance sheet/statement of community forest's carbon stocks, (2) Addition of community forest's carbon stocks, (3) The establishment of a delayed logging microfinance institution in Terong Village, (4) Establishment of the Group-Based Community Forest Management Document, (5) Availability of a policy draft on community forests as part of the village spatial planning.

The span of approximately 700 hectares of community forests, combined with the active participation of the community, intensive assistance from Arupa well as the close cooperation with the village government, makes Terong Village a great potential to produce a breakthrough in community forest-based climate change mitigation efforts and sustainable economy for the community.

Measuring the Carbon Potential, Knowing the Assets for Sure



“The trees that are measured and marked are those whose diameter are above 16 cm. It is said that the optimum carbon sequestration start from the size forward. The bigger its diameter, the wider its crown, the more carbon it sequesters,” Sugiyono, Chairman of Jasema Forest Farmers Group (KTH Jasema), explained.

For Arupa, carbon measurement process with 27 residents of Terong Village is an important part of community forest-based management. “Until now, the people are invited to plant the trees, without any effort to involve them actively in mitigation efforts,” Dwi Nugroho, Arupa Director, explained. The tree measurement results performed at 10 points in plantation area and 10 points in the field area has become the basis to calculate how much carbon sequestration in Terong Village. The calculations show the carbon stocks in the community forests reached about 78.97 tonnes/ha in the yard and 49.87 tonnes/ha in the field. Simple explanation about the forest and the tree’s carbon absorption, was able to convince the people that

the trees they planted, has another function other than as an economic resource for their livelihoods.

Good relationship between forest field facilitator, village coordinator, board of KTH Jasema and Arupa, has been able to convince the people that the benefit of carbon measurement will be felt in the future. “Carbon can be traded – but it requires a long process. The important thing is we know how many trees and how much carbon is absorbed in Terong Village, if there are similar programs developing everywhere later, we will be more prepared,” said Rubikem, Forest Field Facilitator.

Previously, the community received an offer from a state-owned companies through a CSR program that it would pay each tree stands for Rp 500,- and this promise was not fulfilled. “People think the money would be given directly after collecting data about the trees, but it was not,” said Sitta Yusti Azizah, Arupa staff. Carbon measurement process produced 250 module books on community forest carbon stock measurement as a guideline for field facilitators. The amount is bigger than what we expected, due to the high interest in expanding the knowledge and the ability of Terong Village residents independently.

More Trees, More Carbon Stocks



Suparjo, Chairman of Delayed Logging Cooperative (KTT) Jasema, said that for them, the trees were an investment, so that the awareness to maintain and grow trees had already existed. “Especially if we get help, we will be more excited to do it,” he said, smiling.

To add carbon stock, which increases with the rising number of trees, the people planted 4,725 teak trees and 1,600 durian trees. The planting activity involved all members of KTH Jasema with the working area of 312.32 hectares. A number of non-member residents were also given trees, as a strategy to get them to join the KTH Jasema, to expand the area of governance.

From the planting of 4,725 teak trees, with an estimated of 80% life expectancy percentage, it is predicted that in 2034 the trees will be able to absorb as much as 493.960 tons of carbon. While the durian tree is not estimated yet because it is a new tree type selected by the community. “We chose durian tree because of its high economic value in the future and we want to be a tourism village, there will be a special declaration. One tree can produce 20 fruits, and each fruit is quite pricey,” Rubikem said.

The biggest obstacle faced by the community was the time of planting, because the seeds came in October, during the dry season. “For teak trees, planting in dry season is a big problem. So we conduct regular irrigation, until the rainy season come.” While for durian tree, which is a new tree type, the people need to learn more. “Durian tree is more likely to die than teak tree, “ said Sugiyono.

Investing in Trees



Since the wood becomes the main source of livelihood in Terong Village, when there is an urgent need, people are accustomed to cut down trees, even small trees to get quick cash. “Usually the money will be used for school tuition, home renovation or capital,” said Suparjo.

Aware that these habits can reduce the process of community forest carbon sequestration process, Arupa initiated a microfinance institution to prevent premature tree harvesting. "In order to maintain trees storing carbon as long as possible in the community forest and to ensure that the urgent needs of society are met, we came up with an idea that those who have underage trees can borrow to Jasema members. Strategies and systems offered are the result of discussions with the community, Arupa only facilitate," said Fajar, Arupa staff who oversaw the process of KTT Jasema establishment.

Suparjo added that residents of Terong Village only cut trees when they were really in need. "If the trees are already matured and can be logged, especially trees with wide diameters, the people would care for the trees even more. For example, the hamlet head would only log the trees when he needed to build a house," he said.

The community agreed to choose a cooperative as the form of a delayed logging microfinance institution delay that is the most appropriate for their needs. "The cooperative in Terong village has yet to touch the forestry aspect, so the people want a special cooperative to accommodate the interests of forest farmers," said Fajar. Jasema Delayed Logging Cooperative (KTT Jasema) was founded on September 3, 2014.

Because the cooperative catered the needs of the residents, the cooperative could quickly gain its initial capital of Rp 78 million from compulsory fees and basic fees collected from the 554 family heads who were members of the KTT Jasema. Although there was a conflict of interest in its early formation stage, the active role of the village head, the hamlet head, Board of Leading Farmers and Fishermen Contact (KTNA) who already discussed with Arupa was the key to the success of the formation of KTT Jasema. KTNA is a rural farmer organization that focused on the development of agribusiness.

The system built by KTT Jasema is simple but ensures accountability and transparency in its management. Capacity building for its management has been continuously improved through trainings in order to manage the loans properly. Clear rules with the SOP guide the KTT Jasema management which consists of six officers, nine hamlet coordinators and three supervisors. Also there is a consultation process at the KTT level for the lending process.

There is a are clear rules in the lending process, which is done by completing forms. Maximum of loan is worth 60 % of the collateral value, in the form of a tree with a diameter of over 60 cm. The hamlet coordinators are tasked to verify the assets of trees as the considerations in lending decision meeting. The meeting will determine, whether the loan proposal can be passed or not, and how much loan can be given.

“Seeing this system, people who are not yet members of KTH and people who have yet to have a tree would also like to join. But the requirement to join is they should have a tree. We hope in the future they also want to plant a tree, so they can benefit from the cooperative,” he added. Adding capital becomes into one of the thoughts of the management so that KTT Jasema can provide wider service. “Maybe in the future we will consider the possibility to borrow funds from Ministry of Forestry, or CSR and other institutions that are willing to do so,” said Suparjo.

Arupa predicts that in 2021 the activities of KTT Jasema can sustain community forest carbon stocks as much as 4.2 tons/year. The carbon estimation calculation in community forests in Terong village is conducted because new tree planting is done within months, as well as KTT Jasema that is only in operation for two months. In the future, the calculation will be done according to the value true.

Steps for the Group-Based Community Forest Management



Residents of Terong village should be proud. They now have a spatial data of community forest area, the basic map to draft Community Forest Management Plan. There are 14 maps that were prepared together with the village administration and KTH Jasema, including spring distribution, administration, village

spatial planning, land use, conservation area, cultivation area, slope, disaster-prone, village treasury land and population density.

This map is generated from field observations, discussions with farmer groups and village Terong village administration, assisted by experts to produce a group-based community forest management plan that contains three areas of activity: silviculture, ecology and social.

“ Although we often plant trees, but we have never managed the planting together, how many are planted, how many we log and when to log. Moreover, people already make plans, Sengon can be logged in 4 years old, Teak 15 years, Sono 15 years, if we can combine the plan with these maps, it would be great, “ Sugiyono said.

For economic development, there are many businesses that want to be developed by the community. For example, Rubikem has many suggestions to use the land in the forest periphery and forest service area as a source of income. Several of his suggestions include service to cut branches and twigs, which can be used as livestock feed or firewood, to grow *empon-empon*, a term for various useful rhizome plant types for further management.

Planning The Village Area

The availability of maps, and the appeal of Bantul administration that villages should have a spatial planning map, has opened an opportunity to prepare the Draft Plan of Environmental and Rural Settlement Planning for Terong village. This draft can be used by Terong village administration to plan the Conservation Area Management (conservation of forests, springs and riverside areas); Agricultural Area Management Plan; Community Forest Management and Conservation Plan; Settlement Development Plan; Trade Zone Development - Services and Development of Office Zone. In the draft, the community forest area of 668.842 hectares spanning in nine hamlets was included to mitigate climate change. The function of the community forest area will be maintained, both ecologically and economically and as part of climate change mitigation.

The process of the “Policy draft to accommodate community forests as part of the village spatial planning” got supports and inputs from the Regional Planning and Development Board (Bappeda) and the Public Works Agency in Bantul. In the end, besides changing the draft name to “Draft of Plan for Environmental and Rural Settlement Planning in Terong village”, there is information that in the Dlingo Subdistrict Detailed Spatial Plan (RDTRK), Terong village is not defined as an area for community forest development. This information becomes the basis to review Dlingo RDTRK. The consideration is the community forest in Terong village should be preserved because it contributes to the economy. Moreover, Terong village has received recognition from Bantul regency as a Climate Smart Village.

The process that involves the community from the beginning, the economic system that meets the people’s needs sustainably, good communication between Arupa and the village administration, as well as supports from the experts have made Terong village as a model village for community forest development as part of a community-based climate change mitigation efforts in the future. The challenge is to continue what has already been started, especially to strengthen the capacity of KTT Jasema, pushing the review of RDTRK, as well as scientific support to strengthen the calculation of carbon stocks.



Public Private
Partnership
Model in Tackling
Degradation and
Deforestation

Public Private Partnership Model in Tackling Degradation and Deforestation

Project of ICCTF – Forestry
Faculty of IPB

Summary

Deforestation and land degradation are major contributors to greenhouse gas emissions (GHG). One of the main causes is the expansion of agricultural land and plantations, which is triggered by social factors such as increasing population, the absence of alternative livelihood, the use of destructive land clearing method. Meanwhile the choice of plants is not considered as an emission factor, although certain plant species have high CO₂ emissions. Currently, land-based carbon sequestration efforts offer the possibility of greenhouse gas (GHG) emission reduction from the atmosphere with a large enough scale. Through photosynthesis, carbon is absorbed by annual plants and soil

Conservation area has been rarely viewed as a tool for climate change mitigation, despite the fact that it has been efficiently proven to reduce the rate within the region. Unfortunately, climate change mitigation activities in conservation forest have yet to gain a lot of support because it is impossible to get aid. One of the important issues discussed at the COP 19 in Warsaw was strengthening the role of the private sector in handling environmental problems through public private partnership (PPP). With the PPP scheme, everyone can carry out real action by implementing sustainable production, sustainable development, and protecting tropical peat forests. Conservation area of Giam Siak Kecil - Bukit Batu Biosphere Reserve in

Riau Province, which is initiated by the private sector, includes conservation forest area, community lands and privately owned forest area. The biosphere is one of the important locations that needs the implementation of a partnership in climate change mitigation.

The strategy in this project is to find a relationship model between the causes of deforestation and GHG emissions that could cement the importance of biosphere role and as the basis of inter stakeholder partnership assessment model as needed. And part of the solution is the development of Climate Smart Agriculture.

Measuring Deforestation, Finding Solutions



Giam Siak Kecil - Bukit Batu Riau Biosphere Reserve (CG-GSKBB) is one of the seven Biosphere Reserves in Indonesia. Located in two administrative regions, Bengkalis and Siak regencies in Riau Province, the biosphere is the only concept on conservation area and environmental cultivation that is internationally recognized. Spanning at 705.2710 hectares, area of CB-GSKBB is a mix between conservation and production forests that are not converted. Core area of CB-GSKBB area of about 178 722 hectares consists of Giam Siak Kecil Wildlife Reserve (SM GSK) of approximately 84.967 hectares, Bukit Batu Nature Reserve (CABB) of approximately 21,500 hectares, production forest concession of Sinar Mas (PT Bukit Batu Hutani Alam, PT Dexter Timber Perkasa Indonesia, PT Sakato Pratama Makmur, and PT Satria Perkasa Agung) of approximately 72.255 hectares, and the former forest management concession of PT Rimba Rokan Lestari. While the buffer zone in which people can do activities that do not destroy ecosystems such as nature tourism,

research and training is 222.426 hectares. The transition zone, which can still be cultivated as plantation, planted forests, farmlands and settlements, are an area of 304.123 hectares.

The spatial analysis of land use and land coverage changes in CG-GSKBB from 2010 to 2014 showed that mangrove forests, natural secondary forest and peat swamp forests have continued to decline. The total area of peat swamp forests in CB-GSKBB in 2010 is 220.227,32 hectares, decreased to 170.994,22 hectares in 2014. When natural forest area declines, planted forest, plantation, residential and open land expands.

Land cover and land use in the core zone, particularly SM BB and SM GSK are also changing. SM BB should not have any cultivation activity. But inside the area, there are land use changes, including 15,38 hectares planted forest and palm oil plantation which has been increasing since 2010. Palm oil plantation in 2010 spanned at 97,37 hectares, but in 2014 it increased to 293,73 hectares. On the contrary, peat swamp forest in SM BB has been declining from 21.441,41 hectares in 2010 to 20.735,99 hectares in 2014.

The same pattern also took place in the buffer and transition zones. Land cover and land use in the buffer zone, which are likely to increase its area, are the plantation (rubber, palm oil), open land, developed land (residential), and the dry land farming. Another disconcerting factor is the change of land cover and land use is allegedly done by slash-and-burn method. Lands that are indicated on fire in 2014 reached 101.723 hectares, with 58.678 hectares in the transition area, an area of 33.690 hectares in the buffer zone, 6.452 hectares in SM GSK area, 2.580 hectares in the core area of non-wildlife reserve, and 319 hectares in the burn-indicated SM BB area.

CB-GSKBB experiences forest fires almost every year, causing declining air quality due to emissions of various air pollutants. The CO₂ emission that causes global warming in CB-GSKBB is caused by deforestation. Research conducted by IPB shows that very 1 hectare of deforestation will increase CO₂ emissions as much as 1.545 tons. On average, the deforestation in CB-GSKBB is 16.119 hectares/year, so it can be estimated that the emissions from deforestation increases CO₂ emissions by 72.227.087 tons/year. Meanwhile the total CO₂ emissions in 2014 from various types of land cover and land use in the reserve is 114.756.480 tons. With that much of CO₂ emissions, CB-GSKBB needs 279.043 hectares of additional forest area, with a basic calculation that peatland forests are capable of storing carbon (C) up to 200 tons/hectares. If the area of forest that is needed is available, an area of 279.043 hectares will be able to save 55.808.561 tons C. Unfortunately, the ability of

various existing vegetation in the reserve is only able to save up to 49.402.419 tons C, so that there are 6.406.143 tons of unstored carbon (equivalent to 23.489.191 tons of CO₂).

This problem can be solved by rehabilitating land that are opened due to land encroachment and fire. Based on the modeling, land rehabilitation was apparently still insufficient. The only way is to keep the CB-GSKBB from forest fires. The modeling shows clearly what actions to be taken by all stakeholders, especially the source of the problem, and its spread has been illustrated in the map with sufficient details.

Looking for a Model of Partnership, Ensuring Commonwealth



The proposal to manage CB-GSKBB collaboratively began to emerge based on a letter from PT. Arara Abadi/Sinarmas Forestry. The content proposed Riau Forestry Agency on the development of Wildlife Reserve of GSK (75.000 hectares), Wildlife Reserve of BB (24.800 hectares), and production forest areas (IUPHHK-HT) of 72.255 hectares that are located in between the two wildlife reserves as Biosphere Reserve with the collaborative management model.

Of the initiative, there had been supports from many parties, which are essentially related to the involvement of all stakeholders, effective management and funding. The support of the community began to appear in 2008 from Tasik Betung village, Siak reGENCY, and then followed by a letter from the Tanjung Leban community, Bengkalis reGENCY.

After its inauguration in 2009, the facts on the field indicate that the rate of deforestation and degradation remains high. Studies conducted by IPB indicated that the expansion of agricultural lands was considered as the direct cause of deforestation and forest degradation in CB-GSKBB. This is proved by the high rate of land use change, and from forests into plantations and mixed farms. Some of the activities or land uses that cause deforestation also produces greenhouse gas emissions. Therefore, it is important to assess the causes of deforestation and forest degradation in relation to policies that can slow deforestation and forest degradation.

Referring to this fact, the IPB team initiated a series of focus group discussions (FGD) to conduct re-analysis of stakeholders that have roles in the management of CB-GSKBB. According to the research results of Pramana, there are 31 stakeholders. While FGD I identified 5 new stakeholders who showed commitment, which has not been involved or not yet involved in the management of CB-GSKBB.

The fundamental problem is the lack of socialization to all parties, especially the community as admitted by Supriyatno, a representative of Sinar Mas Forestry, “familiarization to the public on Biosphere Reserve has never been done, what has been done recently was the contest to pick CB ambassador among high school kids.” Similar opinion came from Mitarudin, a farmer from Temiang village, which represents the voice of the people, “we have never gotten any familiarization, so we do not know where is the boundaries of CB, what is allowed and what is not.”

So far, not all stakeholders understand the duties and responsibilities in accordance with what is already contained in the CB-GSKBB Management Plan, although each stakeholder should have the same goal in managing CB-GSKBB, which requires a mutual perception and purpose. In the next FGD, efforts to agree upon the objectives of CB-GSKBB management were done. The agreements are that CB-GSKBB management aim to establish: (1) The welfare of the community; (2) Sustainability of the businesses; (3) Sustainability of forest/peat ecosystems; (4) Human resources improvement.

The results showed that the fire was triggered by socio-economic factors related to the needs for the land, the high demand for palm oil and the use of slash-and-burn methods as a practical way to acquire the land. The findings should be given full attention in the management of CB-GSKBB. The existence of palm oil plantations is shown through an increase in the changes of mixed farms to palm oil plantations, in which people prefer to change their rubber commodity with palm oil.

Almost all parties agree that the causes of forest deforestation and degradation in CB-GSKBB are due to the lack of law enforcement in the field as well as the needs of the community to improve their economic condition. Ineffectiveness of existing governance is based on the fact that most stakeholders do not understand the roles and responsibilities in the biosphere area. Most stakeholders still view CB partially. This implies that many stakeholders have not actually been able to share authority and understand that the biosphere management should be done jointly.

The process of identifying and developing the model of public-private partnership has been able to recognize clearly its potentials and challenges. The question is whether this will be a joint commitment and be applied in the field for the welfare of the people? Only time can tell.

Organizing Collaboration, Bringing Prosperity to The Country

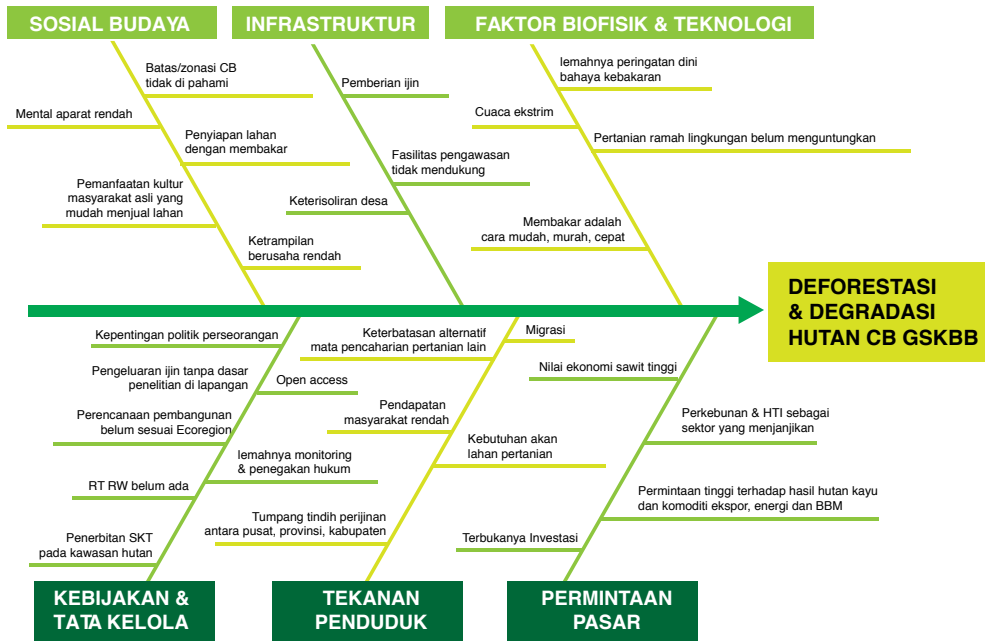
The process of program implementation, which is only six months, has started to increase understanding of the stakeholders on the boundaries of CB-GSKBB and its zones, although there are still many stakeholders who think that the CB- GSKBB area is just Giam Siak Kecil Wildlife Reserve and Bukit Batu Wildlife Reserve. In the beginning, there was also concern in the community that the biosphere would mean that the people would not be able to perform any activities on their lands which are located outside the core zone.

Several rounds of discussions have managed to build the spirit of collaboration among stakeholders to work together and achieve prosperity without sacrificing nature. The stakeholders have also begun to understand their roles and duties, including the clear and precise incentives and disincentives mechanism. On the collaboration management side, this is a very good understanding awareness, because in a collaboration, there needs to be a division of roles and resources.

The interesting thing is the local communities in the CB-GSKBB are very excited to implement agricultural cultivation that is “Climate Smart Agriculture” with the rising requests on demplot production and assistance in their village. The community is also enthusiastic to acquire knowledge and skills, besides agricultural cultivation, such as ecotourism in Tasik Betung village. Therefore, the approach of welfare and generating a sense of ownership are key for the CB-GSKBB management.



From this research, it was also found that the community wants this project to be followed up with a clearer familiarization on the boundaries of SM Giak Siak Kecil and SM Bukit Batu, so there will be no legal problems in the future. In addition, familiarization on which activities that can be done and which activities that are prohibited in the conservation area should also be given.



To further clarify the position of CB-GSKBB, the parties, especially the local government (Riau Development and Planning Agency/Bappeda of Riau Province), expect a stronger legal basis. With the existence of a clear legal framework, it will be easier and can ensure the local government in planning and budgeting activities. Bappeda Riau Province also wants to do an institutional study of strategic and operational management.

Another important note is the high potential for conflict between people with related companies and institutions both in the regency and provincial level. This is related to the lack of mutual understanding and knowledge on the function and boundaries of CB-GSKBB biosphere.



GIS as Guideline
for Street Lighting
Efficiency in
Surakarta

GIS as Guideline for Street Lighting Efficiency in Surakarta

Project ICCTF- ATMI
Polytechnic Surakarta

Summary

Solo City Government should pay more than Rp 27 billion per year for street lighting (PJU). This amount is a consequence of the implementation of a lump sum payment system to state electricity company PLN. Not only this condition burdens the budget of Surakarta City Government, it also contributes to greenhouse gas emissions, amounting to 11.584 tons of CO₂e annually. Efficiency is urgently needed, both in terms of cost and energy. One of the ways is by applying metering systems and using energy saving lamps.

The project of ATMI Polytechnic Surakarta aims to help resolve the problem of Surakarta City Government's limited PJU planning capacity in the long run, and then able to implement energy efficiency, according to the conditions and available funds. Greenhouse gas emission reductions, which is a result of the efficient use of electricity for street lighting, are conducted through four outcomes:

1. Availability of Geographic Information Systems (GIS) for street lighting (PJU) of Surakarta.
2. Availability of Proposed Master Plan for PJU efficiency in Surakarta.
3. The GIS pilot project in ATMI Polytechnic Campus in Surakarta .
4. The operators and planners of PJU Surakarta are able to operate and develop an efficient PJU

A number of challenges need to be addressed first, before Solo is able to illuminate the city without burdening the budget, then save energy and reduce emissions. Completing the database, developing a more comprehensive Geographic Information Systems program, encouraging better coordination between Solo local government, PLN and stakeholders that are related to emission reduction programs, as well as strengthening DKP to continue to the energy efficiency program, at the same time building the capacity of DKP staffs to be able to implement a system that is built into a number of prerequisites that must be met.

Agreed to Pay for The Electricity Use



There are 16.169 PJU points that brighten Surakarta at night. It has been creating headaches for the Sanitation and Parks Agency (DKP) in Surakarta. Because, in 2014, the DKP budget was broken, because it did not take into account the increase of electricity rates in November and operational subsidies of PJU whose service area has been expanding. This inefficiency is caused by the use of mercury lamps or other types of non energy-efficient lamps, and because most of the PJU points, about 70 % still applies lump sum payment system (subscription).

“Whether the lights are off or on, the payment is the same. Cost wise, the lump sum billing system is rounded up. For example, a 125 watt mercury lamp is placed as 500 watt according to the power classification of PLN, so the bill is very high,” Chairul Anwar, PJU DKP Staff said. Now it is time to pay as the electricity usage.

The efficiency is a decrease in the electrical energy consumption of PJU that can reach 60% if the entire PJU uses metering. The efficiency will be bigger, up to 80 %, when applied in conjunction with the replacement of PJU lamps with energy saving lamp technology (a study by Technology Research and Development Center for Electricity of Renewable Energy and Energy Conservation, Ministry of Energy and Mineral Resources on the PJU in Surakarta, 2013).

“Basically, the agency head is always welcome for third parties wanting to come and

help DKP,” Chairul said. Until now DKP still does not have a master plan to improve the existing conditions, the human resources are also limited, only 20 civil servants, and one temporary employee to handle more than 16,000 lights.

GIS: a Step-by-Step Towards Efficiency



“ATMI design projects that provide the step-by-step stages, which step must be done first to help DKP prioritize, which efficiency measures should go first,” Hoedi Prasetyo, ST, Project Manager of ICCTF-ATMI program. Capability of planning includes the selection of appropriate technology according to the needs, scheduling lamp replacement, cost estimation, feasibility analysis and return of investment, as well as the calculation of greenhouse gas emissions, all can be helped by the availability of Geographic Information System.

Surakarta should be proud to be the first city to have a Geographic Information System (GIS) for the management of PJU. Although the system still needs to be refined, at least the data recording is already done in almost all PJU as the basic information for planning and economic analysis for quick business efficiency. “GIS is the program to help us in planning PJU, this really helps for planning PJU in Solo whose data is still in hard copy, manually written on books, the program really helps,” Chairul Anwar said.

Surakarta’s GIS system is web-based built, and requires a good internet connection to derive a map. Currently the GIS is still using Surakarta map from Open Street

Map (<http://www.openstreetmap.org>), which is not detailed, the location only has longitude-latitude coordinate. "You should use a Google map so that the location of the PJU points is more definite," Hoedi explains. Another consideration in DKP is the internet connection. "The internet connection in the DKP is awful, sometimes it's available, sometimes it's not," Chairul said. If it is not taken care of, the function of GIS in supporting the PJU energy efficiency planning in Solo will not be optimal.

There are four scenarios in GIS that can be compared as a consideration in planning efficiency measures. The parameters include the code of lamp, period of lighting:

1. Scenario of Gas Releasing Lamp (mercury) 125 Watt, subscription
2. Scenario of Gas Releasing Lamp 125 Watt, metering.
3. Scenario of Energy Saving Lamp Replacement: LVD, LED 50 Watt, Subscription
4. Scenario of Energy Saving Lamp Replacement: LVD, LED 50 Watt, Metering

Unfortunately, although the GIS program is quite user friendly, simple and reasonable but the PJU DKP staffs have not yet fully understood it. "It is said that the software has scenarios that can help planning. Unfortunately the last training only taught us doing inputs, exercising on database completion because the program has not been completed," Chairul Anwar said.

The Importance of Database Completion



Total PJU data showed 16.169 PJU points that are divided into 10 zones. But the only available data is map of zone 4-10, while map of zone 1-3 is not found. The data completion is the database key to the operation of the GIS. "Zone 1-3 should be completed, and this will be a homework so that GIS can help effectively," Hoedi said.

The lack of database affects the GIS application. "(The program) is still not running, many people are not used to it. For metering scenario, there are many parameters that go double. If we don't clean these, the calculations can miss, but it's an instrument for planning. Must be in detail," Chairul said.

DKP also expects a perfect program, with the interaction of light with GIS. "If there is a light goes off, it can tell, or if there is cable theft, but it takes a more complex system." The good idea from ATMI faces technical obstacles so that its application

missed from the schedule set in the first place. Moreover, Surakarta is a city that has the first PJU GIS program in Indonesia. Nonetheless, the potential for the development of the program can still be done because of the close communication between the ATMI team and the PJU DKP staff.

Two Pilot Projects as the Basic Argument



Two pilot projects, in the campus of ATMI and on Jl. Kanayan, Joyotakan, Surakarta measure energy efficiency through metering and use of energy-efficient lighting. Both showed a significant decrease in electricity usage. “The impact is the streets at night have double the brightness, but 20 % less energy consumption,” Hoedi explains about the use of metering and LVD lamp, a type of energy saving lamp.

Currently DKP has not received funding for metering, while the choice of lamp still follows the same pattern as the previous year until the end of 2014. “We have no new purchases, we still see the development of lamp technology, such as LVD, LED, we still wait for some pilot projects to measure, in case it is just talking heads, results of pilot project will lead us to believe which lamp we should use,” Chairul said.

Strong Determination and Coordination

Inter-agency coordination remains a major challenge for the bureaucracy in Indonesia. ATMI, as an academic institution that carries this idea, also experienced it. Meanwhile, DKP does not have similar problem. “PLN is actually quite open, although PLN’s income will certainly drop with the GIS application. PLN supports, for example, if the municipal government later will do metering, PLN is ready to follow the rule,” Chairul said. The problem, however, lies on the budget that is not disbursed.

Because the PJU energy efficiency increase is the brainchild of BLH (Board of Environment) and DKP (Sanitation and Park Agency) of Surakarta, it is also included in the priority action plan in the Climate Change Strategy of Surakarta City, and RAD-GRK of Central Java Province, and it will be more effective if the municipal government that has indicated a goodwill to do the energy efficiency becomes a focal point in the next process. Meanwhile ATMI, which now has a complete understanding and make the PJU GIS program, and as the first designer of PJU GIS in Indonesia, can take a more focused role as the technical support for Surakarta City Government.

The steps should be taken considering that PJU efficiency measures also require a number of legal measures, such as: renegotiation of related contracts with the PLN and work on bylaws to regulate PJU that are installed by the society. “People usually find their own handyman, install themselves, then PLN claims such installation to DKP. “ Meanwhile, PJU has been growing due to the ever-expanding new settlements.



Staying Bright Without Extra Charges

“It will be useless if it is not utilized. DKP is the key actor,” Hoedi said. Although during this process the DKP Head has said he would fight for the metering system because he wanted to implement a fair payment system. “The agency head once said, if you use it one day then pay for one day,” Hoedi said. But it seems that it needs more efforts to ensure the GIS is used to plan for the efficiency of PJU Solo.

With GIS creation program is already in the MOU, Hoedi hopes that the project’s future development has a clear legal certainty. Meanwhile, Chairul, a PJU staff who follows the process from the beginning, said the program was “not related” as emission reduction measures. “The emissions are associated with lamp replacement, although there are also scenarios of energy reduction by changing lamp types in GIS,” he said.

The ability and capacity of PJU Surakarta operators and planners are the “heart” of the project. With no PJU staff in DKP who is able to operate and develop an efficient PJU, the system will be useless. “Training is not optimal because the program has not finished yet. We are still waiting for the final. If it is in accordance with the needs of DKP, a part of cooperation will follow up,” Chairul added.

The short time for the project implementation has narrowed down the work space for implementers and beneficiaries of the project. If there is a bottleneck in one stage, which may be in the first process of the project, the final goal will not be achieved optimally. The potential of this GIS PJU project to be developed in the future should be considered to provide more time so the prerequisites can be met.

A comprehensive GIS street lighting program will be important for many cities in Indonesia that want to save energy and cut emissions. If Solo can be the right model for other cities, a lot of energy can be saved. Before this comes into realization, improvement the GIS program should be done, as well as institutional and capacity building of PJU management.



Seaweed
Aquaculture
Adaptation:

Becoming an Expert
Through Pilot
Project Management

Seaweed Aquaculture Adaptation: Becoming an Expert Through Pilot Project Management

Project of ICCTF- HUMANIORA

Seaweed as Life Lines

Seaweed farmers in Southeast Sulawesi have been experiencing failed harvest in the last 5-7 years. Ice-ice disease is suspected to be the cause of the failed harvest. Ice-ice is marked with red spots or dots in parts of thallus (seaweed vine) that turn into pale yellow and then gradually turn into white. Thallus becomes brittle and easily broken. The most visible symptom is slow growth. Then the seaweed's color becomes pale and in some parts of thallus it turns white and rotten.

Seaweed aquaculture has been conducted by people living in coastal areas, either as a means to improve their economy or to reduce the pressure of capture fishing. Seaweed aquaculture in Southeast Sulawesi can contribute around 50% or more to family income, making it as the most efficient alternative livelihood to do in small islands area where men and women are involved in the activity. However, the failed harvest also caused the uncertainty for the people whose lives depend on seaweed aquaculture.

Climate change and extreme seasonal climate variation are thought to be the driving force of the problems, Samsuddin (2013) said that the global rising of sea level temperature, the heat wave (Kelvin) that brings warm water mass from the sea into the Buton territorial water and the internal heat wave (Soliton) affect the marine and fisheries condition, including the seaweed aquaculture.

Based on the understanding, HUMANIORA Foundation encouraged the pilot project on seaweed aquaculture that was participatorily conducted by members of seaweed farmer groups in Tobe Island and Renda Island, Towea District. According to a 2010 census, seaweed was the most produced in Towea, recorded at 5.725 tons per year, compared to other produces. It is expected that the increased capacity and the change of people's mindset would bring back the glory of seaweed aquaculture in Towea.

Seaweed, Ice-Ice, And People's Anxiety



The project on seaweed aquaculture applied better technology and seaweed aquaculture method. It also aimed to create experts of seaweed aquaculture from a climate change-aware community through active participation. They are experts who gain experience and knowledge from their own research, while incorporating the existing experience and knowledge. The people have conducted observations and efforts to cope with the seasonal change that affected the seaweed production in the last few years.

The seaweed farmers wanted better method in planting seaweed and better seedling so that they could avoid ice-ice and unprofitable debt-bounded harvest.

Familiarization of the new method application in seaweed aquaculture was finally conducted. The activity started by disseminating information papers to one farmer group in each island and organizing a village discussion with seaweed aquaculture expert Petrus Rani, S.Pi, M.Si, technologically engineered seaweed bag expert Agus Cahyadi S.Pi, M.Si, and oceanic climate expert Dr. Fadly Syamsudin.

Through the familiarization, it was known that the information papers had no impact to the climate information dissemination among the farmer groups, Jefferson Tasik, Director of Humaniora, said. The people have a strong story-telling tradition or oral culture, therefore the most efficient method in information dissemination in the field is by word of mouth. This culture is strengthened with a close-knit family system, making the story-based trust system as the best choice in information dissemination.

It was a different story with the village discussion. The discussion in both villages not only involved farmer group members in each village, but also involved village residents as a whole, especially seaweed farmers in the village or other community members who were interested in the seaweed aquaculture. Therefore, participants during a village discussion could reach up to 25 - 30 people. Length of discussion in each village was approximately between three and four hours.

The discussion talked about the effect of seasonal variations and extreme weather conditions on seaweed farming and fisheries, seaweed farming methods, and the application of aquaculture technology through the use of seaweed bag. Jefferson Tasik explained that the village residents were very interested in the discussion because there was no seaweed experts ever came to the village to share knowledge on crop failure due to ice-ice that they experienced. During the discussions, there was an exchange of knowledge and experience between farmers and experts. They were very happy and wanted to work together to find out about the condition of their marine environment.

Better Method and Technology As The Answer

After the discussion was completed, the next step was to make create a demonstration plot for the seaweed aquaculture using better methods and technology, which may be unknown by most farmers in this island, as well as varieties of seaweed that is more tolerant of climate variations. The location of the demonstration plots in Renda Island and Tobeia Island were deliberately selected in a place where the currents meet, both the high-low tidal current and the currents meeting at the strait. Two demonstration plots were built on each island. The first location was based on the high-low tidal current, while the second location was based on the meeting of strait currents.

Furthermore, the rectangular-shaped main ropes were installed at a depth of more than 1 meter, spanning at 25 meters in length and 15 meters in width. Its four sides were tied to a solid anchor in the sea bottom, and additional anchors flanking both sides of the demonstration pilot. After the main rope was firmly attached, the ropes of seedling were mounted inline with the horizon, or also known as long line, to grow



seaweed. The distance between the seedling ropes was approximately 1 meter. The seedlings were planted with a 15-cm spacing between one and another by a rope.

The planting of seaweed seedlings uses three different varieties, at different depths, and with different treatments. The seedlings used are from Gorontalo or also known as Kottoni (*Kappaphycus alvarezii*), Pangkep, as well as local seedlings from each island. Seeds from Pangkep had been tested several times, while the seedlings from Gorontalo were the result of aquaculture breeding that were tested for the first time. Each seed of these varieties were weighed and cut to reach 50 grams in weight for the planting.

The newest planting method not only used three different types of seedlings to test their resistance against climate change, but also applied depth-based treatment. The planting was done, among others, at a depth of 10 cm from the sea level with treatment (they were shaken once a day to clean the seaweed from moss and other debris), and tested using a bag of seaweed at a depth of 10 cm, while planting at a depth of 20 cm, 40 cm, and 60 cm was done without any treatment at all, only relying on ocean currents.

According to Jefferson Tasik, during the short period of the project, the planting had been carried out twice in the demonstration plot (July - November 2014). Each planting period took 45 days. The second planting period had better results than the first. This is because on the second planting, public paid full attention to the success of the project, while the other factors included the sea water nutrient content and ocean current velocity that were higher during the second planting period.

The pilot project also conducted, among others, measurements of sea water temperature, acidity, nutrients, and strong ocean currents. Measurement of seawater nutrients got quite surprising results. Through the measurement, it was known that sea nutrients around the island experienced an increase and decrease inline with the seasonal change and impact. Ocean currents can not be measured during the high waves, but the seaweed harvest in a fast-paced current location (where the two ocean currents meet) and in the ocean depths had better and cleaner results than those grown on the sea level.

Jefferson Tasik explained that, the pilot project discovered that the local seedling from each island had good results with daily growth between 3.01 % and 5.43 %. While the seedlings of Gorontalo and Pangkep were rather difficult to adjust to the new surroundings.

Seaweeds that were planted at the depth of more than 10-20 cm during the first fifteen days after planting did not look quite heavy and large, but the thallus or seaweed vines grew quite a lot. In the next fifteen days the thallus in the ocean depth had faster growth and propagated in all directions, making the seaweed looked large and yielded heavier crop results.

The 50 grams of seedlings that was first planted reached 1 kg in weight when it was harvested, within 45 days in the second planting period. While the seaweeds grown in the bag tended to be clean but were smaller in size because its growth was limited in the bag.

During this aquaculture pilot project, it was discovered that seaweeds could heal themselves quickly, in approximately one week. It was proven when the seedlings started developing symptoms of ice-ice, the seaweed farmers would cut affected thallus at the ocean depth and left it to heal itself. However, if the affected seaweed was located at the sea level, the plants tended to be damaged and depleted by the ice-ice syndrome.

Short rope also plays important role in the success of demonstration plot. With the length of the rope was less than 30 meters, it was easier to perform maintenance and reduced the risk of tangled ropes compared to the usual 100-meter rope. The use of stretched rope techniques or long line with these good results surprised the seaweed aquaculture experts, because the seaweed aquaculture has been using the downward rope technique (vertical line).

The good results obviously indicated an increase in the people's revenue. Moreover, this farmer group active participatory-based seaweed aquaculture pilot project can create "home-grown seaweed expert". Supardi, a facilitator at Renda Island who is

the island's local resident, said, "I was a shy person and seldom talk. I also did not know much about seaweed aquaculture. But during the interview conducted by the fishery agency, I could talk a lot about the development of seaweed aquaculture pilot project, from the territorial water condition and its impact to the growth of the seaweed. I can also mention environmental parameter numbers and the seaweed disease. I am surprised with my own development, I have so much to say about seaweed."

The people also get answers on their question, Ice-Ice or the white spots on the seaweed is a syndrome caused by temperature rise and sea environment, not a disease (Petrus Rani, 2012).

The Program's Sustainability Is The People's Wish

The success of the seaweed aquaculture pilot project, especially after the second



planting season, has broadened the mindset of the people about the future of seaweed aquaculture with the local seedlings they have. There is hope that the seaweed that was their life lines continue to be the prima donna commodity from Towea. The following list are recommendations to avoid ice-ice disease as suggested by people of Towea district based on their experience:

Pick the appropriate location for seaweed aquaculture

Use quality seedling

Arrange distance between the stretches, at least 1 meter

Arrange the depth of planting between 10 - 30 cm from the sea level

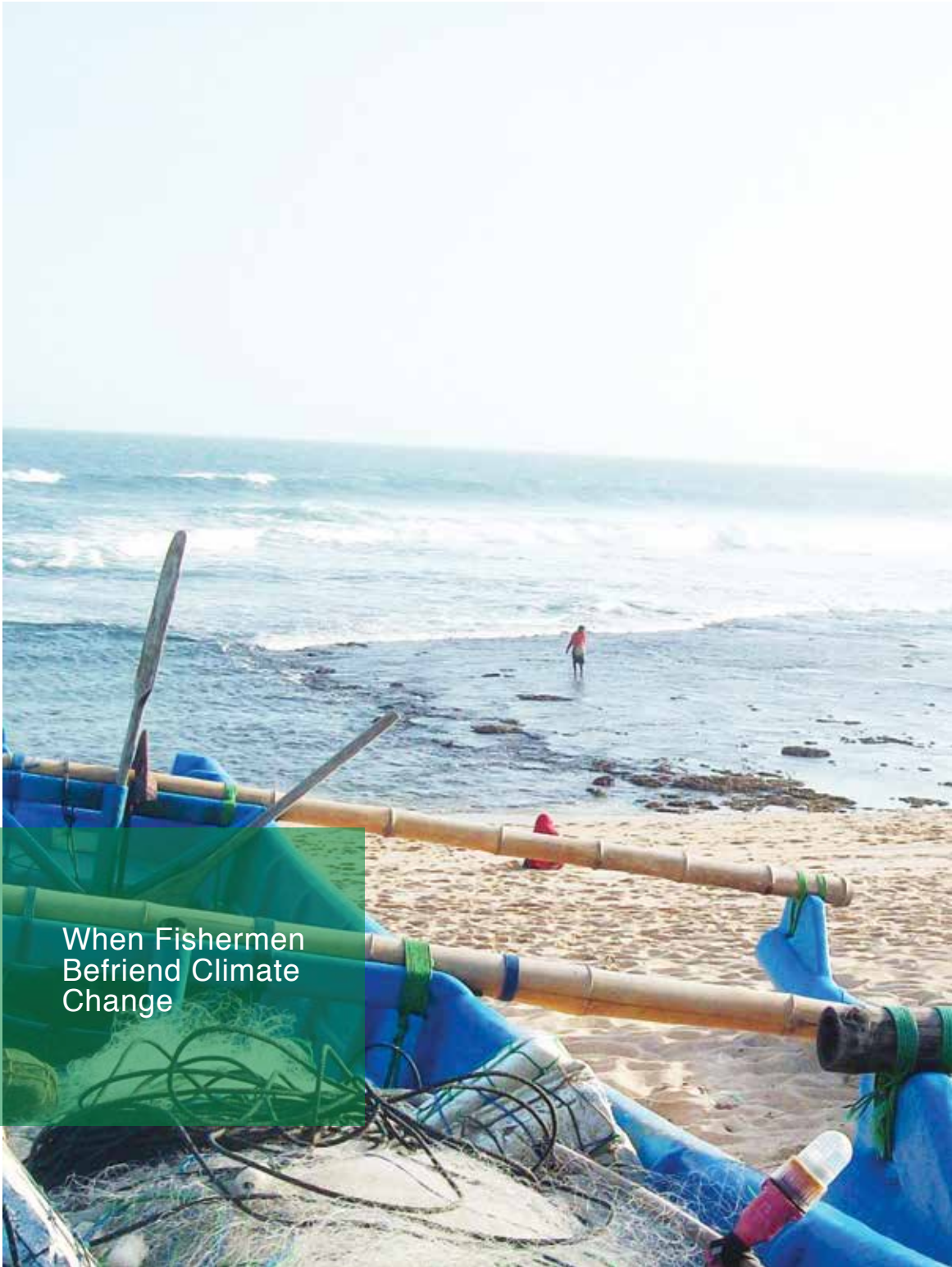
Follow the planting pattern according to seaweed planting season calendar in each aquaculture center Cut thallus that is affected by ice disease

Renda and Wangkolabu village government have consciously committed to replicate the design and construction of demonstration plots for farmers and arrange aquaculture plots around the island to reduce conflict of land border between farmers or transportation line in an island's territorial water. Another breakthrough developed by farmer group is placing lamps in the project location so that boats going to the shore to dock do not hit the seaweed. Moreover Towea local government is committed to follow up the pilot project by putting it as a district research program in the district's development planning meeting (musrenbang).

Another lesson learning from the project is a participatory seaweed aquaculture pilot project needed longer time in assisting the community to convince and involve them, because the people are not used to be involved in a program whose benefits can not be personally gained. It took proofs to build their awareness on the project's long term benefits. The success of seaweed aquaculture in Renda and Tobeia Islands is a milestone that triggers requests for assistance from other regencies to conduct similar program in their areas.

Jefferson Tasik said that if the seaweed aquaculture project would be continued or developed in other areas, community involvement as implementors should be maintained, including the construction design and treatment of demonstration plot. "We need to think of a longer term program, at least one year, to get lessons learning in relation to annual planting, which has close relation with seasonal pattern, climate dan local sea condition as the base of planting season calendar in each seaweed aquaculture centre," Jefferson said.

Operational support for farmers involved in the project should also be seriously considered because during the project development, they left their daily responsibility to work for family.



When Fishermen
Befriend Climate
Change

When Fishermen Befriend Climate Change

Project ICCTF and Bingkai

Seaweed as Life Lines

Capture fishing fishermen is a profession that is highly dependent on natural friendliness, a vulnerable profession and tends to be ignored. Data showed that due to extreme weather that lasted only between January and May 2014, a total of 61 fishermen were missing and died at sea (Kiara, 2014). The number has been increasing since 2010 (86 fishermen), 2011 (149 fishermen), and 2012 (186 fishermen).

In relation with these facts, daily and weekly maritime weather forecasts can assist fishermen in deciding when to go to sea as the climate pattern keeps changing. Information on maritime weather forecasts by BMKG is available and publicly published through its website. Besides the weather forecasts from BMKG, other important information from the Agency of Marine Research and Observation (BROK), an office under the Ministry of Marine and Fisheries (KKP) is in the form of potential fishing location.

Action research conducted by Siregar et.al (2011) showed that the short message service (SMS) could be used to disseminate information on weather forecasts and

potential fishing location. Weather information for fishermen also plays an important role in affecting the livelihood/income and also life safety. For aquaculture farmers, such as seaweed farmers as well as salt and fish farmers, maritime weather information (sea current, wind, waves) can affect the success of aquaculture. Responding to the challenges faced by these fishermen, Bingkai introduced weather forecast information for fishermen and improve skills to obtain such information from BMKG and BPOL. Ultimately it is expected to establish the institution on fishing communities who are able to obtain and disseminate such information independently to fellow fishermen.

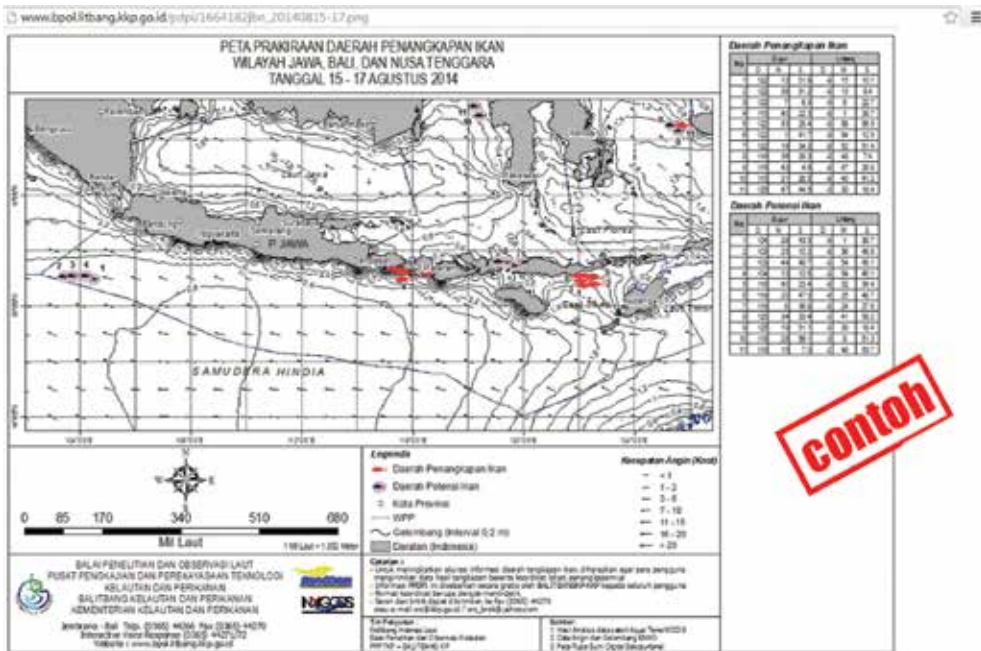
Building The Trust From Fishermen



Bingkai, despite having a relationship with the local community, chose to start this activity by reopening the communication to begin mapping the actors and the system prevailing in the society. Direct visits to meet fishermen community was done in Sangihe, Yogyakarta, Pelabuhan Ratu and Ujung Kulon. Discussions conducted with key figures such as representatives of a group of fishermen, fishing leaders, traditional leaders, and government agencies to map the expectations and proposals resolve the problem.

Bingkai finds that in general, the fishermen did not get enough attention from the government. Especially for the weather information they have never gotten any SMS on BMKG weather forecasts. The fishermen also said that the local government seldom visited the beach/fishermen working area.

The approach hit right at home, with the number of fishermen who are ready to be engaged in Sangihe (32 people), Yogyakarta (81 people), Pelabuhan Ratu (20 people) and Ujung Kulon (15 people). Their characteristics are also diverse, in Yogyakarta, they work as fishermen but also work agriculture and animal husbandry, while for Sangihe and Pelabuhan Ratu fishing is the main profession. The age range is between 20 years old and 51 years old, most of them are traditional fishermen, with small boats, which can only reach 4-5 miles. Meanwhile fishermen in Pelabuhan Ratu can reach more than 10 miles. To access the information, all the fishermen have mobile phones from the old models (90 characters/SMS) to the more sophisticated (> 250 characters).



From the discussion, there was an agreement to conduct familiarization and training on using weather information and maps of potential fish location. This process was carried out in June- July 2014 and continued with the assistance. Activities that were challenging enough is to apply the results of training and do the testing. Complexity occurs because the data from BMKG have to be processed, while the training results show lack of confidence. Fortunately, the facilitators are enthusiastic, therefore the problem can be solved together. Data retrieval and data forwarding to the fishermen communities for three months, August- October, was conducted after familiarization and training in each region. In August, Bingkai team did the weather forecast information retrieval for fishermen and PPDP, distribution via SMS and putting the data on the information board in all four areas.

In general, a good response arises from Drini and Siung in Yogyakarta because they can determine the wave height, wind speed and sea level current. According to them, the wave height information is accurate especially the middle wave, the information on edge wave in Drini and Siung is less precise, while the current and wind speed is correct. Supriyo, chairman of the fishermen group in Siung says, "The fishermen have been waiting for information like this, because we have troubles in predicting the wind direction, waves and fish position. So far, we only use the titen science, for example the wind will blow harder during the lobster and pomfret season." Similar opinion came from Yanto, secretary of fishermen group in Drini, "information from Bingkai is very useful in deciding to go to sea or not. Although the potential fish location information can't be used because it is out of reach, but the fishermen are happy because the safety factor is maintained. As a member of the search and rescue team, I can also use the data for prevention and search for victims."

Fishermen in Drini and Siung are already aware about the weather information. They know Stormsurf, a website for surfers, from an Australian tourist named Will about 5 years ago. At first they observed that every time Will come to Drini and Siung, there would be big waves. Their curiosity led to communication with Will and Stormsurf. Information from Stormsurf has become their benchmark. For the fishermen, information about the edge current in Stormsurf is accurate enough and ready to use without any process.

After receiving information from BMKG introduced by Bingkai, the people understand and believe its accuracy. According to their experience, information from BMKG and Stormsurf complement each other and it makes them enthusiastic. They process and distribute data from BMKG and BROK via SMS and place it on the board, alongside data from Stormsurf. The next challenge is to build an institutional system and its mechanism. Everyone realized that the institution in question does not make a new group that stand alone but it is a part of an existing group and has a separate name / subgroups.

The Young Ones Get The Trust, Have The Power

Referring to the penetration of mobile phone, the biggest user is the young people aged between 18 years old and 27 years old (53 %), between 27 years old and 38 years old (20 %) and under 18 years old (19 %) or a total of 92 % of the users are young people (Viva.co). While a research by Siregar et al. (2011) showed that the involvement of young people (students) from the family of coastal communities is very important in the climate forecasts dissemination. The program from Bingkai refers to both information, so that in the maritime weather and potential fish information dissemination, young people were involved to be part of the program.



From the discussion, there was information about young people who could potentially become an important part of the program. There were three students in Pelabuhan Ratu who were interested in the program, six in Ujung Kulon, eight from Drini beach, Yogyakarta and 12 from Siung beach. While in Sangihe there are 4 students in Kendahe and 3 people in Belengan.

The challenge is to make the fishermen to trust the information that is disseminated by young people. So far, the dominant perception is the knowledge of senior fishermen (including their parents) is higher than the young ones. Senior fishermen know and understand the sea and the weather. This perception is about to be changed because it involves new information. One way to do it is by instilling the idea in the participants that each person has the ability and the opportunity to help themselves, their relatives/friends and the community.

Mixed training becomes part of Bingkai strategies in building communication and trust between young people and fishermen. During the process, better understanding of the roles and knowledge was established. And its application continues to the field. Response from fishermen is becoming more positive especially the processed data from BMKG has quite a high accuracy rate of about 80-90 %.

One young man from Drini Beach, Anis (17 years old), said, "I am proud I can help the fishermen amidst my busy school schedule. Usually I access the Internet to retrieve and process data from 14.00 to 16.00. At first, it was a bit difficult to translate the colors in the map, but now it is not that hard anymore. The difficulty is the slow access due to weak signal reception." Meanwhile, when asked whether he felt burdened because he should access, process and disseminate weather information,

Sugeng from Siung, replied, “Of course not, because I enjoy it. And it’s great to be able to help the fishermen. I can’t be late in disseminating the information because they will definitely ask for it.”

Positive responses are also obtained from the school that considers the importance of these activities and is grateful for involving students in the community empowerment activities.

Potential Fishing Location Data: Ask Why

Since the introduction of BROK’s potential fish map, fishermen have shown their interests. The only problem is the potential fish location is always beyond the reach of traditional Indonesian fishermen. On average, they can only reach 5 nautical miles, while the fish location is always beyond 10 nautical miles. One critical question they always raised was whether there was no potential fishing location data in lane 1, their capture area.

The Titen Science, A Surviving Local Genius

One of the interesting things in the life of fishermen in Drini and Siung are the ever present Titen Science that is based on observation and understanding the natural phenomena, and it has been passed from generation to generation. Some phenomena and habits can still be explained by the logic, but the rest remains unknown.

An interesting example is the fishermen have a time to break on Tuesday Kliwon and Friday Kliwon, a moment to gather with their extended family, the community. When asked why the fishing break, which is well-organized, falls on those days, no one can explain clearly.

There are also some signs of nature that people still believe, which indicates the presence of fish or lobster. For example, Sugeng, a fisherman in Siung said, “I always observe the conditions of the sea water from my garden up on the hill. If there is a huge wave from the middle and it has muddy color and lasts longer then we can be sure we will harvest pomfrets. But if the murky color is on the edge, then there will be no fish. Also, octopus season falls on mangsa 8,9,10. For the wind direction and magnitude, our titen science still fit except for mangsa 7 and 8.”

Capturing The Impact, Catching Sustainability

Something that is evident from the dissemination of weather and potential fish information is that the fishing communities have become more open to information apart from the knowledge they already have. They really benefit from the accuracy of weather information. The fishermen, especially those in Drini and Siung, are still waiting for a more accurate and affordable data on potential fish. Although the Gunungkidul fishermen communities could not reach the potential fishing location due to the small boats they use, but the information dissemination



project via SMS has become the fishermen and coastal organizations' strengthening media to be able to manage their resources better. Intensive dialogue process has encouraged communities along the southern coast to organize themselves and begin to identify existing problems, analyze and develop strategies for a more equal and sustainable area management.

Meanwhile the most visible changes are, among others, according to the information of fish abundance in Ujung Kulon area, fishermen who received potential fishing location information via SMS and had faith in it, headed towards the location according to the information received. This information provides a significant result due to the accuracy of the information.

With the sufficient level of data accuracy and fishermen's confidence, the risk of accidents can be minimized. Especially for lobster fishermen, the damage of their net can be minimized. Another issue is the simplification of information from BMKG, which becomes a challenge. Fishermen need information that is ready-to-use. The fishermen groups in four areas had expressed the demand, and it is estimated that it would make the information be more popular.

Sustainability becomes a keyword and it can only be done if there is a process of institutionalization. Although the learning process of the eight regions are quite varied, but from existing development, the project sustainability is well-portrayed. For example, a group in Siung finances themselves from the group fees that is directly 2 % deducted from the net catch and adds 1 % of the basket purchase deposit.



Weather & Climate Information
Text Message Service for
Farmers and Fishermen in
Kupang, East Nusa Tenggara:
**Pilot Project for
Local Government**

Weather & Climate Information
Text Message Service for
Farmers and Fishermen in
Kupang, East Nusa Tenggara:

Pilot Project for Local Government

Project ICCTF-PIKUL Foundation

Nature Is No Longer Predictable For Farmers and Fishermen

Climate change affects the lives of farmers and fishermen. In the last 15 years, farmers and fishermen in East Nusa Tenggara (NTT) have been experiencing failed crops and fishing problems. The rainy season is no longer following the same pattern as it has been taught by the older generations of farmers. This situation makes farmers nowadays face difficulties in determining the beginning of planting season and the type of plant that is in line with the rainfall at that time. Seasonal wind pattern at seas, such as tidal height, wind direction and rain, makes going to seas becomes more difficult and dangerous for fishermen. Catches were decreasing when the expected season did not fit with the fishing gear and the location of the intended fishing.

When traditional knowledge is no longer reliable, it is time to introduce new knowledge: season and climate forecast information. The season forecast contains information on rainy season period and rain characteristic, which makes it a useful information source for farmers. Meanwhile marine weather forecast information includes tidal height, wind direction and velocity as well as ocean current, which makes it very useful for fishermen and aquaculture farmers.

Seasonal and daily maritime forecasts are actually available in the BMKG website, but farmers and fishermen generally do not have the knowledge and skill to obtain the information from the website. On the other hand, the field officers are limited in terms of number of personnel and have time constraint to reach out to farmers and fishermen due to vast coverage area. Therefore, the seasonal and daily weather forecasts need to be introduced in effective and easier ways, in this case via SMS, a means of communication that is most familiar to farmers and fishermen.

Dynamics of Climate Information System Project



The climate SMS project aims to build a co-ordination system to collect, process and disseminate weather and climate information to farmers and fishermen practically and easily. Starting with the assessment study of information needs to know how much knowledge that farmers and fishermen have on weather and climate forecasts information that has been issued by the government as well as to recognize the type of weather and climate information they need most.

The study also discussed the program of information dissemination to farmers and fishermen that is being implemented by government, including KATAM (Integrated Planting Calendar for farmers), Regional Potential Fishing Information, SI-Mail (Disaster Information System, Climate Adaptation and Environment). Lesson learning and a number of recommendations for improvement become the basis for preparation of the project activity in the future. Recommendation of the system is called SMESTA, which stands for Important SMS For Farmers and Fishermen.

After mapping the needs of farmers and fishermen, the next step is to develop the interpretation module and information system installation module, workshops for field

facilitators as well as farmers and fishermen, and workshops that are in collaboration with government agencies. One hundred cadres from farmers and fishermen groups participated in both workshops. These cadres will help spread knowledge among group members and fellow farmers and fishermen.

According to Torry Kuswardono, Director of PIKUL, the workshops were given to farmers, fishermen, and staff who are the tipping point or focal point in the community. Tipping point theory in general illustrates that extreme changes are often triggered by small things, where the main requirement of the change is the existence of people - who, although they are few in number, have the social skills, high life spirit and has the ability to influence people other (Malcolm Gladwell, 2007).

For workshop involving government agencies, there were 20 Field Officers in districts and cities who were involved in the workshop on climate and weather information systems, they also receive weather and climate information periodically. These 20 field workers are expected to pass on their knowledge about climate change and the need for information to farmers and fishermen, as well as providing feedback to their institution and BMKG.

Torry Kuswardono explained that the related local government offices (SKPD) such as BMKG, Counseling Agency, Agriculture Agency as well as Fisheries and Marine Agency were involved since the needs assessment process, information processing and monitoring of the information dissemination to fishermen and farmers. The agencies's engagement is very important to develop a model of cooperation among institutions at the regency level, BMKG, with farmers and fishermen. It is expected that the cooperation model can generate recommendations for the development of climate and weather information systems, which will be part of related agency's planning program.

The collection, dissemination, and development of weather information via sms were conducted every day for three months, whereas monitoring of activities was carried out with government agencies. The main achievements of this project was providing information to the 1,000 farmers and fishermen in the regency and the municipality via SMS. Project of Smesta climate information dissemination used SMS Gateway approach.

SMS Gateway is an SMS application that works both ways and is usually used to send and receive SMS in bulk over the Internet. Telecommunication company will deliver SMS messages that have been written to the SMS Gateway company for further distribution.

Technical obstacles that happened the field, among others, was about the SMS quota restrictions. Sending SMS using regular numbers have limited delivery quota, ie 100 SMS per day. Sending SMS in a large amount must apply the subscription system to the telecommunications company (Bulk SMS) where the company charges a relatively expensive tariff. But on the other hand Bulk SMS service allows PIKUL to have unlimited SMS receiver.

The main drawback of the subscription of Bulk-SMS is that it only works one way and can only send text messages to users of the same telecommunications company. Recipients can not send a feedback to the sender of the SMS (server). This is different to the SMS delivery via regular number where recipients can immediately respond. To use the interactive system or the two-way system, telecommunication company charges specialized commercial tariffs.

Pikul finally used Bulk SMS service with an interactive system from related telecommunication company because between October and November 2014 there was a hike in the number of SMS recipients. At first, there were only 300 recipients during July-September 2014 and the number rose to 1,083 people in November 2014.

Beside the weather information via SMS, PIKUL also produced printed information such as posters and maps (sea current map, maps of potential fishing location, sea floor maps, maps of the border to improve the catch and fuel efficiency) as the additional information. Sending map as the additional information faced various difficulties due to geographical conditions of Kupang bay. Considerable distance made the posters were not always well distributed.

Climate SMS program coordinator for Kupang City, Yersi WEO, said that, "With adequate information, farmers can determine the beginning of the planting season so they can prepare the land, seeds, and plants that will be grown during the rainy season, while fishermen can minimize the business risk and casualties with maritime information and potential fishing location. In general, if the farmer managed to reduce crop failure and planting failure, it will result in increased local food security."

Partnership Barriers With Media

Through this project, it was known that the decision to sail or not to sail was not made by the fishermen who received SMS but by the shipowners. So the safety of the fishermen was still threatened if the shipowners ignored the weather information that had been given. To reduce these barriers Pikul approached the shipowners and engage in dialogue about the importance of maritime information in maintaining the safety during sailing.



Similar things happen with the information dissemination through print media. To give community more information on the weather and climate SMS, the project needed media exposure. PIKUL held media visit to build partnerships with the media. PIKUL understood the availability of adequate information

that could be easily understood by farmers and fishermen would minimize the risk of planting failures and failed crops for farmers. Mass media that PIKUL had visited were, among others, RRI Kupang, Timor Express Newspapers, Pos Kupang Newspapers, VictoryNews Newspapers, Radio RSKK.

Information dissemination through mass media was hampered by the media company's policy. The mass media have limited space, either a page or airtime. The allocation of pages and airtime is the policy of the company. Therefore, advertising rates were periodically applied to the delivery of weather information and information on potential fish. Meanwhile, free delivery can only be done through press releases or radio news broadcasts. There is no specific policy of editorial and companies to deliver weather information in the mass media in Kupang.

Climate and Weather SMS and Those Who Benefited

According Torry Kuswardono, as of November 2014 the weather and climate information SMS has reached 1083 people, consisting of 475 farmers and 374 fishermen, 100 seaweed farmers, 5 ship captains, 32 village staffs as well as 97 officers of SKPD-NGO-academics. And it has been made sure that at least 30 % of SMS recipients were women. This is to ensure dialogue between men and women based on the same information, in order to prevent the strengthening of the dominance of men over women.

According to the field survey, each person re-send the sms to at least three people who they consider important. Therefore, the indirect recipient of this information can reach up t 3000 people through SMS forwarding.

Based on the monitoring results conducted by PIKUL and SKPDs, it was clear that the community of fishermen and seaweed farmers received significant benefits from this project. In the fishermen group, a fisherman from Sulamu area testified during the evaluation workshop in November 2014 that the information on potential fishing location had resulted in good catches.



“A few months ago when PIKUL provided information regarding the potential fishing location, we got the catch of tuna with a significant difference in the amount compared to the previous catch. With the potential fishing location map, we went straight to the area where fishes gathered,” said Halidun (40), a fisherman from Sulamu.

On the other hand the direct impact of the climate information SMS could not be seen on the farmers because the project period is different from the farmers planting period. So far, the visible result was significant evidence of seaweed farmers. SMS on weather information had saved some seaweed farmers from the high tidal waves in their agricultural plots. They managed to save between Rp 12 million and Rp 15 million.

“I got the information from a text message about the high waves that will hit. I hastily lifted my seaweed so they would not be hit by the wave. And it was true, the next day a big wave came, but I had saved my seaweed. I can save seaweed from dozens of my ropes weighing approximately 300 pounds,” said Soleman Say (54), a seaweed farmer from Tablolong.

The following is the calculation of the potential loss of seaweed farmers in Tablolong village if they successfully perform a full harvest in a year. Potential losses that can be avoided can reach Rp 1.83 billion per harvest. This loss is calculated if any seaweed farmers, amounting to 115 people can take the right decisions when faced with bad sea weather. Meanwhile, in one year seaweed farmers generally work for 9 months, with number of harvest in the 9-month period is 16 times of harvest. Thus, the proper use of weather information can avoid a loss of Rp 20.8 billion per year.

Indication that the weather and climate information is needed by the group of fishermen, seaweed farmers, traditional crossings, and farmers were seen from the direct response on the disseminated information. Of the 202 responses collected, 88 responses expressed gratitude for the information, and about 47 responses requesting additional information or inquire weather forecast for the next few days. The fishermen also asked the potential fishing location so that they could use time efficiently when going to sea, so they no longer gambled when they were in the middle of the sea. On the other hand, the farmers asked the rainy season and the proper planting time after receiving the initial forecast of the rainy season SmeSTA provided from Beginning of Rainy Season Forecast information.

Program Sustainability By SKPDs



The phase that PIKUL conducted in this project was still relatively early phase to develop an appropriate information dissemination system. “System transfer, expertise, and knowledge of the SmeSTA system have yet to run perfectly during this period. We need to conduct the project for one more period so that SmeSTA can be adopted by the SKPD in the regency and municipality. To make SmeSTA sustainable, we need one more phase, which is system transfer to related SKPD,” Torry Kuswardono said.

Considering the main duty and function of each sector, the SMS Gateway system can be transferred to three or four agencies: information on maritime weather and fish potential can be done by Marine and Fisheries agency or related institution, information on weather on the land and rainy season forecast by Agriculture agency, information on weather and extreme weather warning by Regional Disaster Mitigation Agency.



To prevent overlapping and double revenue, each SKPD needs to compile data of recipients according to targets based on their duties and functions. For example, fishermen and seaweed farmers group are the responsibility of Marine and Fisheries SKPD, farmers group is oleh SKPD pertanian, while BPBD is responsible to send information to the governmental structure in the regency, starting from regent, district head, subdistrict head, village head to hamlet head or neighborhood unit head.

Moreover, Torry Kuswardono explains several recommended activities to transfer the system that Pikul initiated. The recommended activities are, among others, drafting an MoU for system transfer, workshop on basic weather and climate information to operators in each SKPD, workshop and assistance for system installation and system operation for 6 months, drafting of regular report to SKPD heads, budget advocacy to City Council (DPRD) as well as sharing knowledge and breakthroughs.

A seminar can be organized at at the end of the project to present lessons learned from the SMESTA pilot project. The seminar can result in inputs from related SKPD that are involved in a number of project monitoring activities in several villages. Until now, the response that Pikul receives from SKPD is the staff deployment to carry out seminar, workshop and monitoring together. There has yet further interest on the project continuation because the final seminar with SKPD has yet to be organized, but BMKG Lasiana has expressed interest in learning the weather and climate information system that Pikul developed.



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