



Role of microfinance to support agricultural climate change adaptations in Indonesia: Encouraging private sector participation in climate finance

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Abstract

The demands of mitigation and adaptation policies are important to understanding a country's climate change preparation by providing microfinance in the agricultural sector. This could be seen as a strategy to fight against the challenges of future food security. In 2014, Indonesia established climate change adaptation policies. This legislation aims to pave the way for making actions on climate change adaptation mainstream in national and local development planning. Public and private finance have supported the implementation of the climate actions. However, most funding is still used for mitigation. Adaptation finance needs support, especially in agriculture. This research paper studies opportunities for microfinance to play a role together with existing resources in supporting climate change adaptation in Indonesia. The data was acquired and analysed through a literature review, analysis of case studies and interviews with stakeholders in the climate change-related financial sector. The central findings regarding the opportunity for microfinance to contribute to the existing schemes in Indonesian climate change adaptation finance for agriculture are worthy of the result. This study found that adaptation finance is mostly used for indirect activities. Meanwhile, local communities, and farmers in particular, need directly targeted measures to adapt to climate change. An alternative approach is providing microfinance, insurance and capacity development for farmers to produce high quality agricultural products. This would contribute to optimizing the agri-food value chain, which supports socio-economic development of stakeholders, especially farmers. Hence, microfinance appears to be one potential solution to support direct climate change adaptation actions for the agricultural sector. However, this may not be strong enough to finance the entire needs for agricultural climate actions. Adaptation is contextual, so it has to be grounded in the needs of local communities. Microfinance needs public sectors support as well as other resources from the private sector. In the case of rapid response to disasters, which often destroy the agricultural sector, microfinance should be advantageous in supporting adaptation. However, in reality, it does not work, as it is prevented by regulations. So, this can be an area the public sector can support as a risk-taker as well as by providing initial funds and resources for scaling up efforts.

Introduction

Bappenas (the Indonesian Development Planning Agency) has established policies on climate change mitigation (RAN-GRK) and adaptation (RAN-API) in 2010 and 2014, respectively. The policy documents provide strategic responses and routes to smart climate development in

Indonesia. They also aim to provide a direction for making climate change mitigation and adaptation actions mainstream in the sectoral and cross-sectoral national development planning processes in the short-term (2013-2014), medium-term (2015-2019) with the RPJMN

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THE LANDSCAPE OF PUBLIC CLIMATE FINANCE IN INDONESIA IN 2011 - USD 951 MN TOTAL



CLIMATE POLICY INITIATIVE

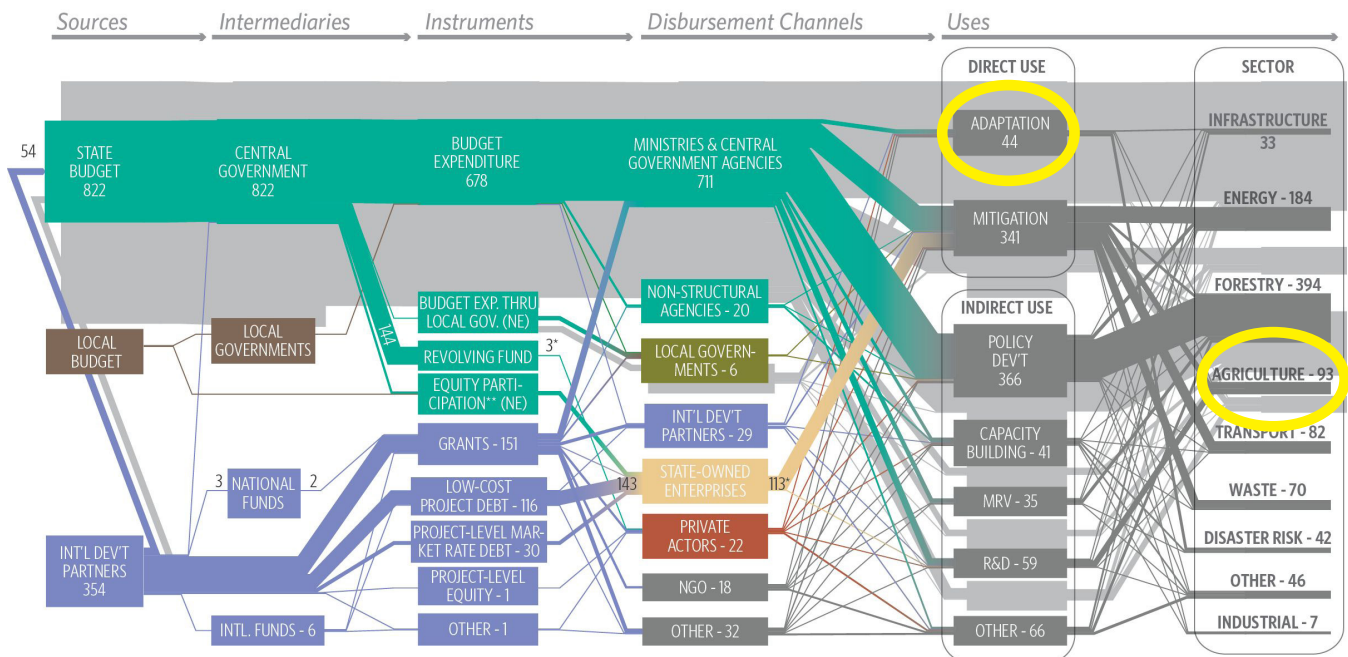


Figure 1 : Indonesia Climate Finance (Adaptation and Agriculture are highlighted)

Source: Hammill, A., Matthew, R., & McCarter, E. (2008) (Reprinted by permission with authors' remarks on the figure)

(Medium-term National Development Planning) and long-term (2020-2025) with the RPJP (Long-term National Development Planning) (Bappenas, 2014). The policy documents need to be converted into action plans, and the actions have to be financed.

In November 2015, the result of the Conference of Parties (COP) 21 in Paris approved the allocation of equal budget towards mitigation and adaptation in Indonesia (UNFCCC, 2015). Bappenas has been working with local governments and several development agency partners in transforming the national action plan into local action plans in pilot provinces. However, the progress has been slow because they found it difficult to identify mitigation and adaptation needs. Also, because of international pressures, Indonesia has put more effort into achieving the mitigation target for deforestation and forest fires (Utami et al., 2015) rather than on adaptation.

In order to finance adaptation activities, especially in agriculture, microfinance from private sectors could be one potential resource. The Indonesian government already put a large amount of funds into its national budget to subsidize the microfinance sector. This research paper aims to study the opportunities for microfinance, together with other resources, to play a role in supporting climate change adaptation activities for the agricultural sector in Indonesia. Mitigation and adaptation strategies in this paper refer to climate change action and policy.

Background

Indonesian agricultural climate finance

Indonesia expects to reduce climate risk while driving its economic growth. The government created sweeping policy reforms by introducing new targets of reducing greenhouse gas emissions, which was announced at the COP21 2015 in Paris. The new policy is targeting a reduction of 29% on business as usual levels by 2030, or a 41% reduction with international support (Damassa et al., 2015). Climate actions in Indonesia has been made mainstream in government development priority sectors, which are maritime development, energy security and food security.

Most financial resources for the climate actions come from public sectors and are used for large-scale mitigation actions. 8,377 billion Indonesian Rupiah (IDR), or 951 million US dollars (USD), was released by Indonesian climate finance from public sources in 2011. The expenditure in 2011 (**Figure 1**) falls below the Indonesian government's estimates of annual finance required to meet emission reduction targets by 2020. However, public finance from domestic and international sources are projected to increase in the near future due to implementation progress on the RAN-GRK and the RAN-API (Climate Policy Initiative, 2015).



Indonesia's climate finance landscape is dominated by national public resources, representing 66% of total investments. Using budget transfer instruments, the Indonesian Government disbursed IDR 5,526 billion (USD 627 million) for climate finance. About 75% of domestic climate finance was utilised for "indirect" activities, such as policy development, research and development, establishment of measuring, reporting and verification systems, and other enabling environments. These activities are laying the foundation for "direct" activities to boost and scale-up effective finance allocation in the future (MoF, 2012). The Government of Indonesia focuses on indirect activities as its role in developing and implementing policies and frameworks to attract direct investments, which will help with the process of making climate action mainstream. The RAN-GRK was established in late 2011, which is one of the reasons for high expenditure on indirect activities. In the medium-term, mitigation spending is expected to decline (Tanzler & Maulidia, 2013). Regarding adaptation, direct finance went mostly to disaster risk management. It is estimated that only about 1% of the climate finance was spent on agriculture, and it is an even smaller percentage when divided into adaptation coming from private actors versus state-owned enterprises.

The identified contribution from the private sector is made from the central government's investments, mostly through the purchase of shares in state-owned enterprises (Climate Policy Initiative, 2015). However it still all went towards mitigation. There are also other potential resources of public finance that can be utilized by Indonesia. There are two large potential international trust funds which have not yet provided funds to Indonesia optimally, namely the Adaptation Fund (AF) and the Green Climate Fund (GCF). Indonesia also has the Indonesian Climate Change Trust Fund (ICCTF) to access wider development partners and investor communities, leading to a more pronounced participation from the private sector (ICCTF, n.d.,).

The AF and the GCF are multilateral funds under the United Nations Framework Convention on Climate Change (UNFCCC). The AF has been financing a number of adaptation programmes in vulnerable developing countries (Adaptation Fund, 2015a). Meanwhile, the GCF has been supporting adaptation activities related to technology development and transfer, and capacity building (GCF, 2015). Since Indonesia has no accredited national implementing entity under the GCF, Indonesia needs multilateral implementing agencies, such as the United Nations Development Programme (UNDP), World Bank and ADB (Asian Development Bank), to access the fund. The AF can finance long-term projects which require more than

1 million USD, but it has to follow international fiduciary and safeguard standards (Adaptation Fund, 2015b, para. 3). As with the AF, the GCF's funding can reach 31 million USD. GCF project development involves three key stages: (i) GCF project identification, (ii) Concept Note development and (iii) Funding Proposal elaboration. For more information about the GCF project development, please refer to GCF (2015).

Meanwhile, there are still many small-scale agricultural projects, especially in the adaptation sector, which lack financial resources. These projects are actually significant in terms of enhancing the food security of the community. Supported projects from the public sector funds are slow to be established. For example, GCF and AF take more than one year to deliver funds to the implementing agencies (AECOM, IGES, 2015). Adaptation projects from the view point of disaster relief, such as following crop failure, need significant media coverage to be supported by the government. In contrast, the project from Mercy Corps catalysed attention, funding and action at the city and national government level to build the resilience of farmers and vulnerable agriculture (Mercy Corps, n.d.). Compared to these public sector approaches, microfinance can provide finance quickly when the farmers need help, without a long bureaucratic procedure or general public attention covered by news media.

Contributing microfinance services to climate change adaptation

The process of making climate change adaptation mainstream could switch any new, additional funds to general development programmes. This limits the opportunity to evaluate the programmes quantitatively, particularly regarding their benefits with respect to climate change (Klein et al., 2008). Microfinance allows different opportunities to be easily evaluated specifically.

In the framework of livelihoods, people, including farmers, control various types of assets – human, social, financial, physical and natural – to perform strategies in the pursuit of expected outcomes (Scoones, 1998; DFID, 1999). Microfinance services (MFS) can enhance livelihood assets in three ways: direct income effects, indirect income effects (i.e. education and training) and non-pecuniary effects (i.e. stronger social networks and increased confidence) (Galab et al., 2006; de Aghion & Morduch, as cited in Swain & Floro, 2007). In the context of climate change adaptation in agriculture, the following MFS attributes can enable farmers to accumulate assets:

- Microcredit focuses on lending funds to poor people, including farmers, so they can increase their adaptive capacities for income production, includ-



ing job creation, enterprise growth and increased crop production. Microcredit helps to build and diversify farmers' assets. Returns can be either saved, consumed or reinvested. Microcredit providers also offer loans for other purposes, such as emergency relief, education, and home improvement. It contributes to reducing vulnerability.

- Microinsurance provides protection against specific perils such as injury, death and natural hazards for farmers, in exchange for regular premium payments (Churchill, 2006). Thus, it protects assets and gives farmers the courage to gain a profit (Morduch, 2006). Microinsurance can also use weather-index based payments, which is a more suitable concept for agriculture.
- Microsavings aims to be the safe storage of money for farmers. The small balance deposits allow farmers to access lump sums to fulfil predictable and unpredictable needs. It can also be used for insurance, investment and yielding more assets.

Development of microfinance system

Hulme and Mosley (1996) found that only non-poor borrowers whose incomes are above the poverty line enjoy positive impacts from microfinance, while poor households do not. In fact, they even had less income after receiving micro-loans. Daley-Harris, Director of the Microcredit Summit Campaign, admitted that microfinance is not the single solution to global poverty. A holistic approach of targeted interventions is needed to create an effective tool for the very poor (2007, p. 1). Yunus (2003, p. 171) emphasizes that micro-credit can reduce poverty when it is combined with other programs that increase people's capacity. The agricultural sector, especially food production, is a potential area that could be unleashed by these programs. The government should develop an inclusive financial sector integrated with poverty reduction efforts (Chowdhury, 2009).

Microfinance can be an alternative tool for empowering people, including farmers. However, complex socioeconomic factors need to be taken into account when implementing microfinance. This is related with the fundamental principle of microfinance as a tool to support the sustainability of the livelihoods of local people. A case study in Andhra Pradesh, India, suggested that the standards of for-profit businesses have to be applied in evaluating the microfinance industry. This includes measuring the success of a program, investigating potential corruption, and assessing impact on the target groups (Levin, 2012). Lack of attention to these factors can cause failure of the microfinance programs.

Cultural differences have to be considered in a geographical context. It is still debatable whether MFIs should use international standards or self-governance. This discourse affects implementation techniques of microfinance to balance profit with social justice. Levin (2012) argues that the microfinance industry cannot be standardized due to the contextual differences related to culture and geography. He believes that MFIs should be free to practice autonomously and gain independence, in order to bring about the success of each project. Nevertheless, it also means that the institutions have to work very carefully to keep the trust of the community.

Additionally, MFIs have to protect their institutions from potential moral hazards of borrowers by introducing disciplinary mechanisms (Hussain, 2015). It is a formula that establishes a relation of docility-utility through the scale, object and modality of control over borrowers (Foucault, 1995). Components of the disciplinary tools include constant surveillance and subtle techniques. This can lead to successful relations between system norms and credit clients. In the rural microfinance system, borrowers, such as farmers, can watch, support and learn from each other. This reciprocal supervision acts as delegated monitoring, where the welfare of a borrower is adversely affected by the poor performance of other borrowers (Bond & Rai, 2008). Due to this surveillance, MFIs are able to achieve very high rates of repayment. In addition, the system of surveillance also leads to self-correction through individual watch (Baert, 1998). Management and operational lessons learned from successful MFIs can provide valuable inputs for the development of microfinance systems for the agricultural sector.

Methods

The method utilised for this research is qualitative meta-analysis. The data was acquired by conducting a literature review, several case studies, and interviews with finance stakeholders in the climate change sector. The authors used three data collection methods, in which each method supporting the others. The study focuses on literature review as the main objective, because it can be conducted effectively in the starting phase of research to fetch information rapidly and efficiently. Most of the basic information was utilised in the research process by providing a benchmark. The case studies support the theoretical aspects found in the literature review. Finally, the interviews aim to verify findings and to complete missing information for the discussion.

The structure of the case studies uses the problem-oriented approach. This suggests solutions to the major problems identified in the case studies (Monash, 2007,



p. 1). There are several cases from government programmes and other projects financed by the ADB, Japan International Cooperation Agency (JICA), Special Climate Change Fund (SCCF) and Global Environment Facility (GEF). Meanwhile, the interviews were conducted with a semi-structured method from June 2015 to March 2016 in Jakarta, Indonesia. These interviews were conducted one on one with several microfinance institutions (MFIs), including Micra, Living in peace, and Koperasi Kasih Indonesia. In addition, interviews were conducted with public banks, including BRI, BTPN, Mandiri and BNI, since these are Indonesian Government banks with many branches scattered all over Indonesia; therefore, they are potential banks for the provision of microfinance. From those MFIs and Banks, 12 participants were willing to be interviewed. The main questions during the

interviews were about their microfinance products and the possibility to form partnerships with climate smart agriculture projects.

This research method can be duplicated. With any interview preparation or problems model, there must be enough detail provided so that the reader can duplicate it or evaluate its relevance. The manuscript uses a comprehensive framework as its major theoretical concept and the relevant framework for climate finance. The framework diversifies finance, which will include arrangements for Indonesian commitments to public and private adaptation finance. This framework must be such that the twin goals of reversing anthropogenic climate change and facilitating agricultural development can be viably funded and achieved.

Table 1: Contribution of MFS to livelihood assets

Direct contribution		Small direct contribution
Financial	Investment in livelihood activities	<ul style="list-style-type: none"> Rise in frequency of regular money inflows
	Savings (for a particular credit scheme)	<ul style="list-style-type: none"> Securing finance
	Rise in household assets	<ul style="list-style-type: none"> Improvement in financial management capacities
Social	Establishment or social bargaining power	<ul style="list-style-type: none"> Strengthening relationships of trust, networks and exchange through loan groups
	Reinforcing organised groups	<ul style="list-style-type: none"> Pathways to political or civic entities
Natural	Encouraging sustainable soil and water management practices when a loan gives more favourable interest rates on that condition	<ul style="list-style-type: none"> Cash for investment in clean energy and sustainable natural resource management (SNRM) practices
		<ul style="list-style-type: none"> Improving institutional skills for SNRM
		<ul style="list-style-type: none"> Diversification of other activities will reduce exploitation of natural resources
		<ul style="list-style-type: none"> Securing land tenure and resource rights through policies
Human	For particular credit scheme, it contains skills training and education	<ul style="list-style-type: none"> Increased knowledge base by literacy
	Specific loans for healthcare and education	<ul style="list-style-type: none"> Improved health
Physical infrastructure	Several credit packages include sanitation and housing repair	<ul style="list-style-type: none"> Enabling environment and health
	Loans for infrastructure and equipment	<ul style="list-style-type: none"> Ability to invest in better quality infrastructure



Table 2: Adaptation needs of agriculture

Source : Center of Climate Risk and Opportunity Management (2015)

Reactive/responsive	Proactive/anticipatory
Construction of dams or other water storage systems for irrigation	Development of resistant crops to drought, salt and insects/pests
Erosion control	Research and development
Changes in the use and application of fertilizers	Soil and water management practices
Promoting new crops and agro forestry	Intensifying and diversifying plantations and crops
Maintenance of soil fertility	Policies on free markets, tax incentives and subsidies
Change in the time of planting and harvest	Establishment of early warning systems
The transition to a different crop	Introducing weather insurance
Educational programs and dissemination of information about water and land management and conservation	Increasing value-added production of biofuels from crop waste

Results

Hammil et al. (2008) elaborated examples of how MFS can enhance livelihood assets (**Table 1**). The examples indicate the various strategies to enable MFS to support sustainable livelihoods.

In Indonesia, the progress of climate actions has sped up due to the COP13 of the UNFCCC in 2007. Indonesia developed a mitigation action plan through the RAN-GRK in 2011 (Bappenas, 2013). In 2013, Indonesia started to develop the adaptation plan through the RAN-API. The RAN-API aims to compile the strategies needed to improve the adaptation capacity of farmers, fishermen, and coastal community which are vulnerable to climate change (Prasetyawan, 2015). There are four resilience targets of the RAN-API: economy (food and energy), livelihoods (health, housing and infrastructure), environmental services (ecosystem and biodiversity), and special areas (urban, coastal and small islands). These efforts are supported by the systems such as research and development, capacity building, and monitoring and evaluation. There are 15 selected pilot provinces which have to translate the RAN-API into the RAD-API, or local action plans (Bappenas, 2014). Nevertheless, currently there are only a few provinces which work on the RAD-API due to lack of resources, such as finance. The World Bank (2012) and Center of Climate Risk and Opportunity Management (2015) have studied the agricultural adap-

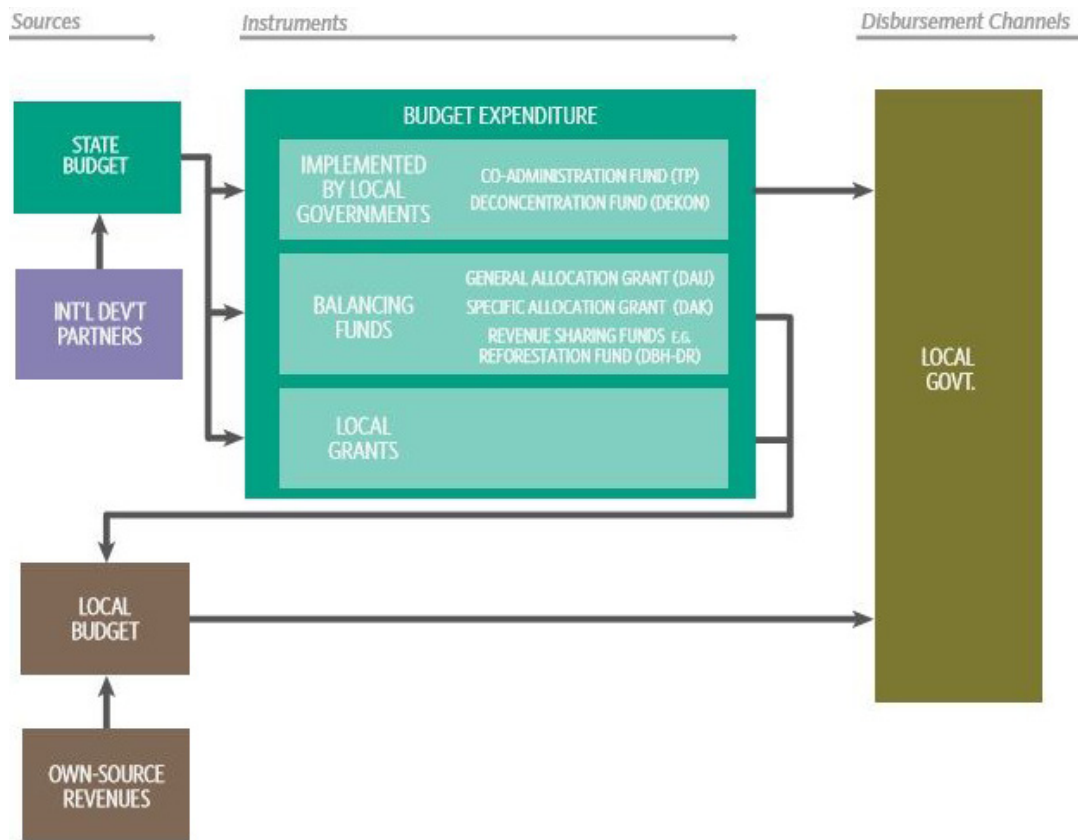
tation needs in Indonesia, and divided these into reactive and proactive types (**Table 2**).

In 2011, the principal instrument transferred IDR 5,975 billion (USD 678 million) of the state budget for financing climate actions. It included budget channelled directly from the international fund to the central government through ministries and agencies (97%). There were blockages to the smooth flow of domestic climate finance from the central government to local governments. The local governments received a very small proportion from the expenditures in spite of the fact that most climate actions need to be implemented at the local level. This condition affects lack of attention to climate-smart agriculture practices (Mumbunan et al., 2012). This is a corollary connection between the green financing policy by the state and implementation by the NGOs with climate change adaptation needs of people in the agricultural sector. More work is needed to identify the bottleneck of flow and find efficient and effective strategies for scaling up public climate finance at the local level.

Besides budget transfers, the central government used equity participation in state-owned enterprises and revolving funds of IDR 1,266 billion (USD 144 million) to generate revenue from potential projects and activities. However, it didn't work well, as it only disbursed IDR 30 billion from the revolving funds in 2011 (Alief, 2013). This



Figure 2 : Range of instruments currently transferring central government funds to local governments
 Source: Climate Policy Initiative (2015) (Reprinted by permission)



indicates a gap between financial transfers and the revolving funds. The scheme is not currently operating as intended. Further work is required to identify the problem and fix the scheme.

The private sector is an important financial resource for climate actions. State-owned enterprises (SOEs) are also potentially significant implementers of climate action in Indonesia for several main reasons. First, the SOEs have two ways to invest in climate-specific activities. They can be part of the core business by establishing renewable power plants or they can be operational parts by measuring cost savings by implementing energy efficiency systems. Second, the SOEs used to have corporate social responsibility (CSR) activities, and even some profit-making SOEs are subject to regulations about CSR. This could be leveraged further, as it provides direct benefits to climate-specific outcomes. Third, some investment barriers faced by private actors might be explained by the commercial orientation of SOEs (Maulidia & Jauhari, 2014). The SOEs have PK-BL (Program Kemitraan-Bina Lingkungan or Partnership/PK and Environment Support Programme/PBL). In state-owned banks, the PK is linked with the PBL. The banks tend to establish the PBL in areas that have been touched by its PK. For example, the banks will provide training or irrigation system support to the farmers group which has proposed credit or

loans through the banks' PK.

The SOEs make investments in order to support their core business and operational requirements which potentially support climate activities. The SOEs have spent 18,183 trillion IDR with 820,158 partners (Kompasiana, 2012). However the division of SOE investments between its core business and operational requirements is not clear. An important supporting instrument for some programmes is the clean development mechanism. There are examples of clean energy projects implemented by several SOEs, specifically related to low-carbon energy generation from biomass, bioethanol, waste, small hydropower and geothermal. Those programs reduced GHG emissions. Nevertheless, in many cases, some projects also encountered significant delays and obstacles. State-owned banks are also actively supporting green lending by developing new programmes and funds. The banks which are working on greening their lending portfolio are BNI (Bank Negara Indonesia/Indonesian Country Bank), Bank Mandiri and BRI (Bank Rakyat Indonesia/Indonesian People Bank). In 2011, BNI lending for renewables and energy efficiency totalled IDR 9,021 billion (USD 1,023 million). BNI was also running a mutual fund for a green mortgage program and renewable energy. Meanwhile, Bank Mandiri contributed IDR 141 billion for financing the construction of biogas power



plants, from a value of IDR 360 billion (BNEF, 2013). A different loan scheme which was implemented by BRI is Plantation Revitalization and Renewable Energy Development (known as KPEN-RP), but the distribution of finance was unclear. There was also another set up of an IDR 1,341 billion (USD 100 million) loan facility from AFD (Agence Francaise de Developpement) for financing energy efficiency and climate change projects.

This result shows that Indonesia has both public and private sector funds. Public sector funds are large and slow while private sector funds will be processed faster, but the size of the funds vary. The adaptation needs for agricultural activities range from dam construction to educational programs for farmers. Since different types of funds have their own advantages, it is important to utilise their uniqueness and match the adaptation demands to the proper financial supplies.

There are challenges that need to be addressed when designing and implementing systems to track local climate finance flows. This can be seen from the significant variation in the budget data provided by Central Kalimantan local government's case study (**Figure 2**). The case study was about reforestation activities and use of compost or organic fertilizer in agriculture. The activities could clearly be categorised as climate-specific programmes (Climate Policy Initiative, 2015). The local governments spent at least IDR 20 billion (USD 2 million) of domestic climate finance in 2011, which was 0.4% of their total resources. A small share of the available budget resources were spent on climate activities, with a wide range in volume across districts, the municipality and the province. Understanding this issue will be important to speeding up and unlocking the implementation of activities on the community level. (Climate Policy Initiative, 2015).

In Eastern Nusa Tenggara, UNDP Indonesia in partnership with the Ministry of Environment and Local Development Planning Agency, run the project named Strategic Planning and Action to Strengthen Climate Resilience (SPARC). The project works on formulating sustainable long-term climate-related solutions aligned with the government's plan, which involve several key activities to tackle the challenges in water security, livelihood and food for the local communities (UNDP, 2015). In Jawa Barat province, ADB implements a very similar project to SPARC. The project is called Low-Carbon and Resilient Development Program. It is located in four selected regencies/cities as pilot areas. The project started with the vulnerability and climate risk assessment and continued with finding the adaptation needs, making the government plan mainstream and exploring future finance resources. Previously, ADB in partnership with

several international funds also had a project named Institutional Strengthening for Integrated Water Resources Management in The 6 Citarum's River Basin Territory (ADB, 2015). The project also began with the vulnerability assessment and finished by producing several small-scale, pilot climate actions supported by the budget of the ADB. Most actions were related to agriculture.

In Brazil, an institution named Agroamigo provides various elements which appear rather attractive from a climate change adaptation perspective. The focus is on the rural poor, which is an extremely vulnerable group to climate change impacts. The Agroamigo has been serving more than 800,000 clients with a distributional channel covering 10 Brazilian states. The credit agents of the Agroamigo have an understanding of the local knowledge, which supports the institution's ability to help the rural poor diversify their income sources and build their assets. Those are all elements that strengthen the broader idea to deliver adaptation strategies to the poorest segments of society through microfinance as a potential instrument (Moser & Gonzalez, 2015).

Another case study from Timor-Leste also shows opportunities for MFS to play a role in financing agricultural climate change adaptation. The project is Building Resilience to a Changing Climate and Environment (BRACCE), which was designed to be a pilot project to showcase farmer managed natural regeneration (FMNR) and other climate change adaptation approaches in order to improve the resilience of livelihoods for small farming communities within the Aileu District, Timor-Leste. By using FMNR and profitable agro-forestry interventions, it is anticipated that this type of agriculture would be more sustainable and better protect the mountainous terrain, while at the same time increasing investment and providing long-term income opportunities for farmers.

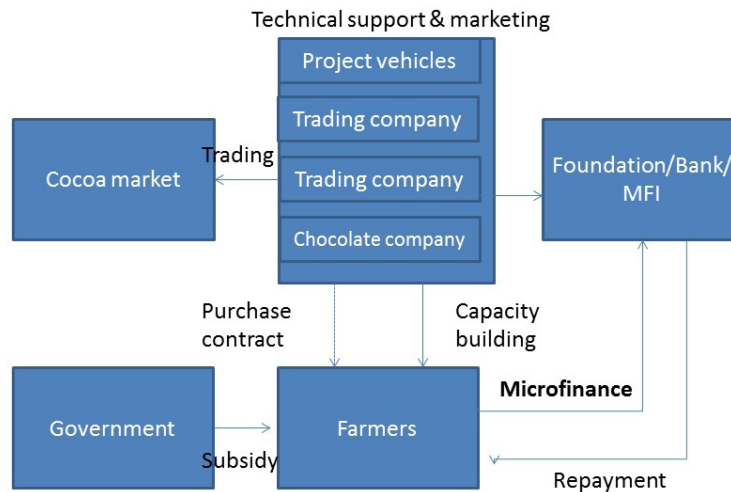
MFS is expected to support farmer implementation of sustainable agroforestry systems and marketing of agro-forestry products. It will increase household income through environmentally sustainable methods (ADB, 2016). MFS also has the potential to improve management of natural resources (i.e. increased reforestation through the use of FMNR and implementation of improved energy efficiency systems).

Another approach is the JICA project in the Boalemo regency, Gorontalo province (**Figure 3**). It is trying to combine mitigation and adaptation measures. Deforestation in Gorontalo is driven by the practice of slash and burn to make way for maize production. Therefore, this area is becoming a target for the REDD+ (Reducing Emissions from Deforestation and Forest Degradation) programme.



Figure 3 : Role of microfinance in cocoa value chain
Source: JICA (2015)

Development of cocoa value chain



The project found that cacao production is a more resilient crop for the area, so they promote cacao farming to replace maize in order to help REDD+ in the regency (JICA, 2015). The project is setting up microfinance for farmers, contributing to socio-economic development in the area by creating new value chain opportunities and doing capacity development for farmers to produce high quality cacao beans.

There was a finding from a series of interviews with BNI and BRI which supports the case study. It found that insurance is a good adaptation measure for climate change. The microfinance programme run by BNI and BRI has an option to bundle an indemnity-based insurance. Farmers who would like to add insurance have to pay an additional fee, which is equivalent to 1-2% interest on top of the microfinance interest. Farmers have to contract a microfinance programme to join this insurance programme. Indemnity insurance is currently available for rice farmers only, besides other types of insurance products such as health, life and accident. The program is projected to expand to other crops in the future, so there is a possibility to have the insurance for all type of farmers with various crops.

The banks like BNI and BRI (R. Agus, personal communication, July 21, 2015) provide schemes that potentially support climate activities, from small to large-scale as well as short-term, mid-term and long-term schemes. The credit schemes are for either individuals or groups. Microfinance programmes from BRI and BNI are ready to cover project development and capacity building on climate actions (BNI, 2014). In the agricultural sector,

crop fields in river basin are vulnerable to floods, which can lead to crop failure and losses to farmers. In such a case, microfinance can help farmers to recover and microinsurance can protect them from financial loss. The government can also help farmers access microfinance by giving recommendation letters. In addition, BNI and BRI are two banks that have been approved to launch a branchless banking scheme, namely Laku Pandai. Currently, the programme focuses on providing savings services, but it will expand the scheme to include microfinance bundled with microinsurance. This can be a useful scheme in remote areas with no bank branches.

Discussion

The common finance scheme for climate actions is still dominated by public finance in Indonesia, either from the government budget or international donors. The RAN-GRK and some of the most emission-intense sectors benefit from the highest share of climate finance. Those are the emerging national-level plans which became the focus of mitigation activities in 2011. The central government disbursed 73% of climate finance, IDR 4,046 billion (USD 459 million), for indirect activities such as policies and enabling environments. About 73% of the finance supported the forestry sector in policy development. The rest of the support targeted energy (7%) and agriculture (10%). Although indirect actions aim to support direct actions, there is currently important direct needs in agriculture to support food security. At the local level, climate finance is mostly used for direct mitigation (83%), with the remaining share used for indirect activities (17%). In term of direct mitigation action, the



Table 3: Adaptation needs of agriculture which can be potentially funded by microfinance
Source: Adapted from Center of Climate Risk and Opportunity Management, 2015

Reactive/responsive	Proactive/anticipatory
Changes in the use and application of fertilizers	Development of plant species that are tolerant/resistant to drought, salt, pests, etc.
Promoting new crops and agroforestry	Diversification and intensification of food crops and plantations
Changing the time of planting and harvest	Development of weather insurance
The transition to a different crop	Increasing value-added production of bioenergy from crop waste
Educational programs and dissemination of information about conservation and management of land and water	Assistance with existing cultivation or agroforestry, from pre-planting, to growth stage and post-harvesting

local spending went to the forestry and energy sectors. Each region had unique patterns of distribution, either focusing on indirect activities or heavily investing in direct mitigation activities.

There is some uncertainty in tracking resource flows from the national and international levels. The CPI study was unable to estimate the amount of climate finance for agricultural adaptation actions from the private sector and particularly from microfinance in 2011. This is likely due to complexity in identifying applicable activities. There are also pros and cons of international level funds like AF and GCF. On the positive side, the size of the funds is really large and may draw attention for further support. However, the application procedure is complex and slow. It may take more than two years for funds to arrive at the local level, while farming communities need quick finance to produce food.

To achieve the mitigation target, most funding goes towards large-scale mitigation actions. Only about 5% of the climate finance is used for adaptation. Climate finance is also facing problems of access at the local level and overcoming a very long bureaucracy process. Meanwhile, there are growing needs for agricultural adaptation finance to support implementation of actions at the local level. Most adaptation actions still focus on strengthening institutions, conducting vulnerability assessments and making the adaptation needs mainstream in the government plan. Even though food and agriculture is one of the priorities in the government plan, some projects which want to increase community resilience only established a few small, pilot adaptation projects. Those kinds of projects are the action which is actually needed more by farming communities.

There are both international, national, and local funding sources for agricultural adaptation needs. There are dif-

ferent recommendations for long-term and short-term finance. A rapid climate change response can be supported by short term finance, which has a shorter application period. It could also become additional finance to ramp up activities quickly (Schalatek et.al., 2010). Long-term finance means the finance requires a long-term plan and has a long application period. Short-term finance will help the climate change-specific adaptive capabilities and can be more appropriately funded by private sector finance, including microfinance. Long-term finance can be used to enhance general capabilities and should be supported by public sector funds. The longer-term support will be connected with the mainstreaming of climate finance to synchronise with general development goals.

Microfinance is a potential resource of climate change finance related to banks. There are 6,400 MFIs which have a good opportunity because the existing microfinance is not yet used for climate actions (MICRA, n.d). Therefore, it should be utilized to support climate finance. This scheme also can be considered green financing by the banks. It will increase private sector engagement and it can go through public-private partnership, especially in the agriculture-energy nexus sector.

Various types of financing initiatives from ADB, GEF, SCCC, JICA, BRI and BNI provide significant results and opportunities for potential partnership between microfinance and the agricultural sector. ADB, GEF and SCCC adaptation projects have supported the government to make agriculture-dominated, local adaptation actions mainstream in local government plans. This plan can be connected with microfinance schemes provided by BRI and BNI. JICA has a different approach, in which a project extends existing plans by the local government and is connected with microfinance in its project concept. The concept still can be developed into a more advanced



scheme depending on the local needs. Microfinance is important to supporting small-scale agricultural climate actions, because it can address direct needs of the farmers. For instance, in the JICA case study, when a particular crop is vulnerable to drought, the farmers need to try alternative crops to support food security and the resiliency of their livelihoods. It is considered an adaptation measure. Microfinance can help farmers promote alternative crops. It will be useful for the agricultural sector, since this sector currently only gets a small portion of finance towards direct activities. For more information about the climate finance, please refer to this link. The microfinance process is also faster than the public sector. It just takes half a year to make the final money transfer from a microfinance fund LIP to the partner MFIs, while the public budget needs one to two years for the approval process. Likewise, there are blockages to the smooth flow of the public budget to the local government (Climate Policy Initiative, 2015). Therefore, rapid microfinance development is needed to support timely, efficient and effective climate finance at the provincial and district level to fund these adaptation needs (as shown in **Table 3**).

To promote the growth of the microfinance industry, there is the Microfinance Innovation Center for Resources and Alternatives (MICRA) which was founded by Mercy Corps, an international NGO. The MICRA (I. Abdy, personal communication, March 21, 2016) has built a deep understanding of the sector and has a relationship with more than 1,000 MFIs in Indonesia by giving technical and management assistance as well as providing research and innovation. Various donors have been working with the MICRA to support MFIs and low income workers (MICRA, n.d.). Donors have created several funds with promising total investment. The donors have MFI partners which are based in other agricultural countries. The donors lead the investment process, including deal sourcing and conducting due diligence, investment conditions negotiations, and monitoring. It usually takes half a year after conducting due diligence to make the final money transfer from donor countries to the partner MFIs (LIP, 2016).

Even though there are other resources, such as the CSR from SOEs, microfinance is still needed. CSR is not robust enough, as it is not the key activity of the business (i.e. when the business is struggling, CSR budget may be cut). In contrast, microfinance is a part of business, so it will continue as long as the business survives. It is a different approach that goes beyond the CSR. CPI (2014) found that most SOE spending on climate finance goes towards mitigation. It is time to address adaptation in the agricultural sector at the local level, which is lack-

ing the involvement of SOEs. The farmers in West Java need proper water resource management to irrigate their fields. The SOEs' contribution will help the local governments which face finance flow blockages from the central government. Consequently, it will speed up implementation on the ground. Microfinance can be an alternative way for the SOEs, especially banks, to support adaptation needs. Many public funds stop providing finance once pilot projects are complete, so microfinance can fill the gap by ensuring the projects' sustainability. Likewise, there is the PKBL (Heryadi, personal communication, January 20, 2016), which combines CSR with microfinance. After giving loans for farmers to start agroforestry projects or other alternative livelihoods, the PKBL also gives assistance or training for farmers' existing cultivation or agroforestry for all stages of production. This increases the resilience of the agricultural sector and the livelihoods of rural farmers.

Microfinance can support farmers to derive and strengthen their economic and non-economic assets, which are highlighted in **Table 1**. In this regard, farmers have to be able to transform their assets into income, food or other resources for individual or household wellbeing. It is about the capacity to manage asset accumulation, which should be understood very well by the farmers (Moser, 1998). In order to deal with variance in income and consumption, they also have to be able to have a larger asset base from which to draw and minimise or entirely avoid depleting their asset base. The impact of a shock or stress will not be immediately damaging if credit, insurance and savings can help them protect and build up enough assets.

In term of climate change adaptation, vulnerable agricultural stakeholders need microfinance which provides both direct and indirect financial support. Microfinance services help families build assets and coping mechanisms over time, especially through savings and, increasingly, microinsurance products. It also encourages sharing of information and knowledge to influence behaviour. This has been the long-term nature of microfinance services.

Scaling up approaches include insurance and the international microfinance fund. However, microfinance may not be strong enough to finance the whole demand for agricultural climate actions. Adaptation is contextual, so it has to be grounded in the local situation. However, there are things the public sector can do. The MFIs need public sector support as well as other resources from the private sector. Several case studies mentioned previously, such as the JICA project, can combine its project's financial scheme with microfinance. These schemes will



complete each other. Together with the trust funds for supporting initial expenses, this will bring sustainability for climate change adaptation actions in agriculture. Implementing this collaboration is impossible without further study about ideal microfinance schemes needed to complete this discussion.

Conclusion

There is an opportunity to improve the existing schemes in Indonesian climate change adaptation finance for agriculture. The opportunity comes by developing the role of microfinance in climate actions. Indonesia is still lacking direct adaptation activities due to a focus on indirect activities to build the foundation for later activities. However the agricultural sector needs urgent direct activities to support food security. Microfinance is a potential resource which can finance those activities by helping small-scale agriculture projects, in particular, be established. Microfinance will be helping climate finance readiness in Indonesia.

Microfinance is needed for adaptation measures in the agricultural sector. This is a logical framework as microfinance can be useful for filling the gaps in conventional funding. The business approach of microfinance is more robust than CSR. Microfinance bundled with insurance can be another good adaptation measure. Moreover, in the case of rapid response to disasters, which often destroy the agricultural sector, microfinance should be advantageous in supporting adaptation. However, in reality, it does not work as it is prevented by regulations. So, this can be an area the public sector can support, as a risk taker as well as by providing an initial funds and aid in scaling up projects.

From several established local adaptation plans in Indonesia, the most powerful support for microfinance is the ability to help farmers' families build and diversify assets. It can allow them to avoid dependency on a single vulnerable livelihood. The farmers then can have more than one means of supporting themselves and more than one skill set. Another role can be played by the microinsurance schemes or savings which support farmers in dealing with climate change in high-risk areas, such as flood or hurricane-prone regions. In several cases, the donors have to reach farmers' families with development aid or handouts and loans through lender/borrower financial contracts. In this scheme, the MFIs can play a role as distribution channels for the donors.

The microfinance sector in Indonesia is one of the biggest markets in the world. The climate stakeholders should use this resource to help the farmers who still lack access to climate finance. There is a large potential

for growth in the agricultural climate change adaptation if microfinance can be effectively utilized on a large scale for farmers in Indonesia. Furthermore, it will help to shape a bright future of food in Indonesia.

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Conflict of Interests

The authors hereby declare that there are no conflicts of interest.

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