CASE STUDY

Indonesia: su-re.coffee

Synergizing climate change mitigation and adaptation through supporting farmers in utilizing clean bioenergy and climate smart agriculture

Background Information

Indonesia is an ethnically and culturally diverse country with almost 260 million of people spread across more than 17000 islands. Along with the significant economic growth of the country on the past decade, the energy consumption is also steadily increasing altogether with the emissions of greenhouse gases, pushing Indonesia into the 7th largest emitter in the world (Friedrich et al., 2015).

Around thirty per cent of Indonesians are farmers and impacted by climate change bearing rising temperatures and decreasing precipitations. Most of these farmers are cultivating rice and other staple crops, which are highly impacted by the significant increases of temperatures and decreasing precipitations, e.g. ca. 1°C hotter since 1990. According to Takama et al. (2014), the farmer's dependency on rain-fed rice paddy could harm them in the future because of the scarcity of water and harvesting could only be done once a year. These future projections of climate exacerbate two existing problems; (1) high energy consumptions on rural household and (2) farmers' reliance on rice paddy as the main crop.

This case study focuses on **su-re.coffee**, a project led by an environmental think-tank, su-re.co, in Jembrana areas in western part of Bali, which is accountable for roughly thirty per cent of the total rice production of the island. In the five most productive subak (group of traditional irrigation management system), almost sixty-three per cent of the farmers in Jembrana are working on paddy fields. According to Takama et al. (2014; Figure 1) the midland part of Jembrana is indicated as one of the most vulnerable areas in Bali for rice paddy and it has been getting more vulnerable, strengthening the rationale for opting to operate on this location.

To address the problem of over reliance on rice farm and to increase the region's variability on valuable commodity, a potential candidate to be cultivated in the area is coffee, which is suitable for lands at risk of drought. The native home of coffee species is in fact, characterized by low-water-deficit (Coste, 1992; Campanha et al., 2004). Furthermore, Indonesia experienced seven per cent of annual growth of coffee consumption in 2016 and Indonesian coffee sale rose in the global market by twenty per cent from 2012 to 2017.

The project also aims at addressing high domestic non-renewable energy consumption by introducing biogas digesters as a cleaner renewable option. BIRU (The Indonesian Domestic Biogas), a program of Indonesian Ministry of Energy and Mineral Resources, which is implemented by Yayasan Rumah Energy (YRE) estimated that Indonesia will need two million biogas digesters by 2025, but so far roughly 20,000 units were installed in 2018. The Indonesian population is highly impacted by water and indoor house pollution, as well as deforestation and greenhouse emissions. The deployment of biogas digesters can reduce exposure to these issues, gain access to clean renewable energy and free organic fertilizer. Having clear benefits and the support of governments, NGO's and other related stakeholders, biogas was therefore chosen as optimal renewable energy source to mitigate the impact of climate change.

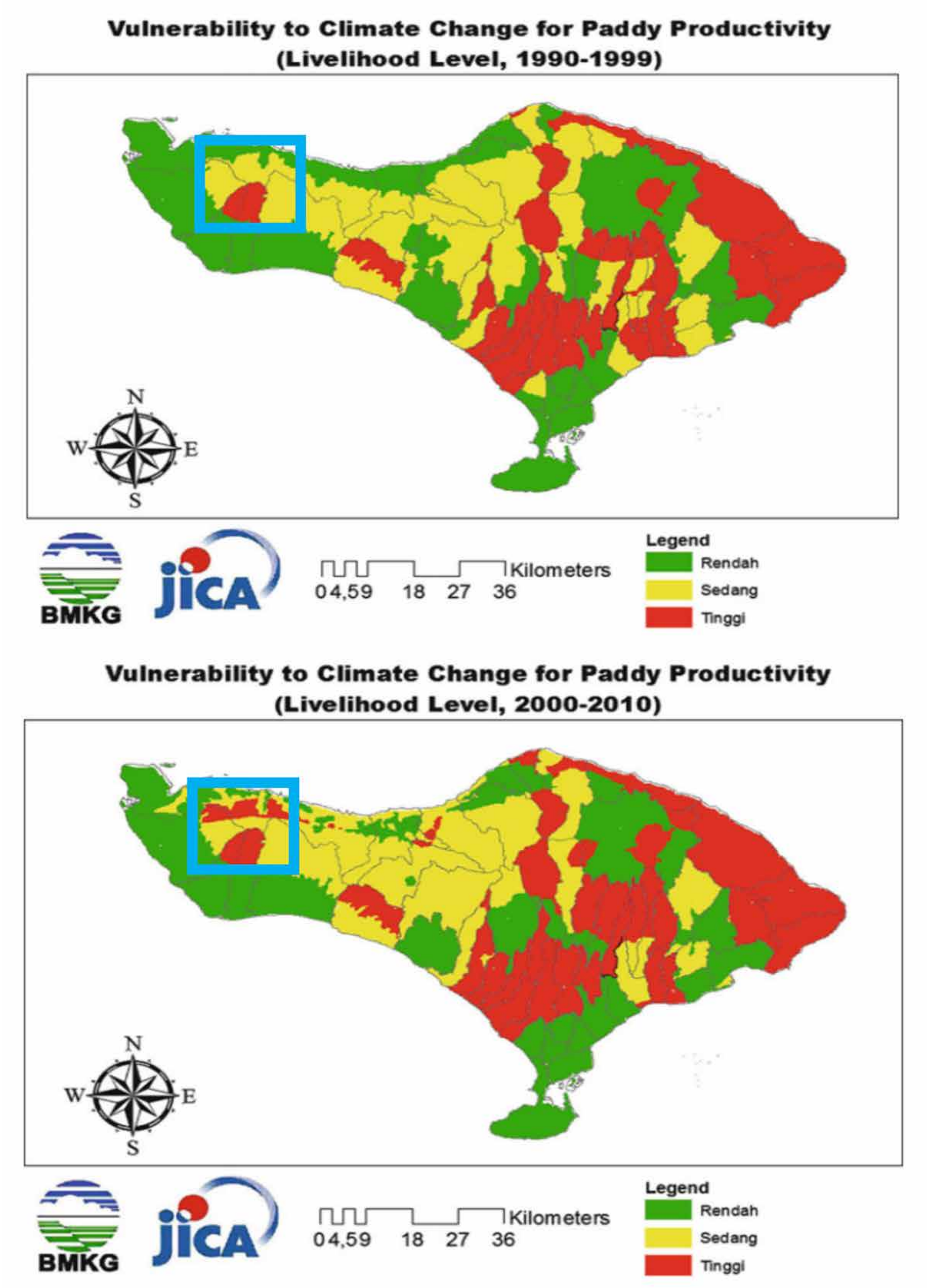

Figure 1 Vulnerability map for rice paddy production: The red color indicates high vulnerability and the green color indicates low vulnerability. The top figure is the vulnerability based on 1990s climate and the bottom figure is based on 2000s climate. Jembrana is marked by the blue square. (Takama et al., 2014).

Approach, Delivery, & Challenges

As afore mentioned, the farmers in West Bali are growing mostly rice and utilize several kinds of non-renewable energy sources, such as kerosene, liquefied petroleum gas (LPG), and firewood, with farmers using the cheapest available options as supply continuously fluctuates. Besides agricultural activities, local farmers mostly own few livestock such as cow, pig, or chicken. These activities provide the farmers with waste product (e.g. manure, coffee cherries, and coffee husk) apart from the organic domestic waste produced from daily activities (e.g. cooking, feeding livestock, and making offerings). As a proper waste management system that covers these rural areas is not in place yet, most of the waste is locally burned or dumped, creating a negative impact on the environment.

This GreenWin case study is addressing those abovementioned problems by synergizing climate change mitigation and adaptation with clean biogas and climate smart agriculture by developing a green business strategy. The project has a twofold aim: (1) creating economic opportunities and (2) developing climate change strategies. These two objectives are synergized around biogas development and climate smart agriculture activities.

Incentivizing biogas and climate smart agriculture

The project goals are strictly connected to agroforestry, poverty eradication, sanitation and health issues. Climate change adaptation through value-added marketing, direct trading, and the diversification of agriculture portfolio through agroforestry, is essential in creating a sustainable socio-economic condition for the vulnerable community (Ahmed and Stockle, 2017).

The project focuses on assisting farmers on the post-harvesting process and sustainability aspects of farming, to enhance resilience and increase the quality and the sustainable value of their products. Knowledge on how to retrieve climate and weather information are also being introduced to increase their yield, by giving them edge against extreme events and long-term climate changes. All of these improvements are packaged under the climate smart agriculture curriculum. Methods of biogas utilization in value-adding activities, for example to roast the coffee, are also being explored. Apart from that, the farmers are being taught to utilize the bio slurry to increase their crops and soil quality while also avoiding the usage of chemical fertilizers.

To further improve the programme's sustainability, a market approach is taken on this case study. Economic opportunities are being generated, by creating marketable products from those sustainable farming and clean energy utilization activities. These products act as a direct incentive for the farmers and the market. Two complementary approaches are deployed to reach this target: 1) Championship approach with stakeholder engagements and 2) a Green Business one.

Championship approach with stakeholder engagement

Leading farmers were picked to work together utilizing the champions' approach, where champions are critical players in supporting both innovation-specific and transformative change efforts. Farmers were selected according to a set of pre-defined criteria, such as: 1) actively and enthusiastically promoting innovation; 2) making connections between different people in the organization, and 3) mobilizing resources ability (Shaw et al., 2012).

One of the selected champion farmer for Jembrana is I Gusti Chakra, whom experienced drought when working as rice farmer. Having been exposed to harsh weather conditions, he is fond of the concept of switching crops from rice paddy to more sustainable and resilient alternatives such as coffee. Apart from climate change impact, farmers are facing extreme freshwater shortages and desertification driven by anthropological changes. Following up the selection of champions, Su-re.co together with BMKG, the Indonesian Agency of Meteorology, Climatology, and Geophysics is conducting a Climate Field School to increase farmers' understanding of climate change risk related to agriculture and specific crops such as coffee and cacao. Furthermore, the Climate Field School also focuses on educating the 'champions' in transferring and sharing the acquired knowledge with other farmers.

To identify and assess win-win strategies, sustainable business models, and socioeconomic enabling environment, three Bioenergy International Workshops were held in Bali in collaboration with Udayana University. At the policy level, the project supports the Ministry of Planning Development (BAPPENAS) in establishing a multi-step policy dialogue and develop recommendations for a sustainable biogas strategy. To conclude, this approach provides the synergy of adaptation and mitigation by developing Climate Smart Agriculture together with Green Business in Indonesia, further enabling the sustainability of these practices.

Green business

The green business revolves around a sustainable coffee production and the utilization of clean bioenergy. A Climate Smart Agriculture system is under development with the assistance of relevant stakeholders (e.g. farmers, NGOs, and government agencies) focusing on eco-friendly coffee production and use of biogas (Figure 2). This has the potential to increase income, job opportunities, and demand for bioenergy, creating a Win-Win solution.

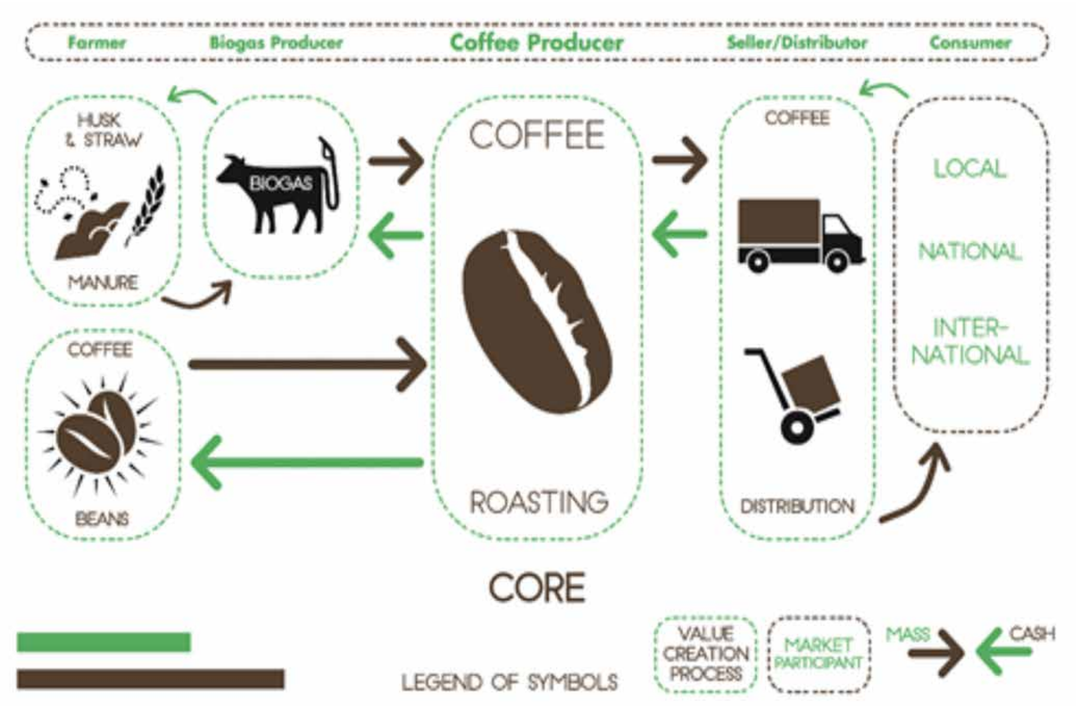

Figure 2 su-re.coffee business model, increasing the market value of both clean renewable energy and sustainable organic coffee

As the core of the green business approach, su-re.coffee has been collaborating with Hungry Bird, a local coffee roaster and café, who's responsible for processing the coffee beans into final products. Several shops around Bali and the Canggu area are supporting the project by selling su-re.co's sustainable coffee along with other local farmers' products. By implementing the farm-to-shop approach to create a market for eco-friendly coffee, this GreenWin case is expecting more Indonesian farmers to adopt sustainable practices (e.g. climate smart, organic farming and resilient agriculture) and clean bioenergy.

Benefits, Lessons Learned, and Outcomes

Contributions to Sustainable Development Goals

As coffee sales increased throughout the project, more farmers became aware of the impact of climate and climate change on agriculture activities and many of them decided to join the Climate Field School in Jembrana. Increasing the quality and quantity of the products on the market represents a key incentive for both farmers and business partners. The case study approach and activities are highly linked with the Sustainable Development Goals (SDG); thus, it is easily translated into governments' development plans. Biogas digesters, a technology that produces biofertilizers and biogas by degrading manure or organic waste, is a potential solution to problems caused by the utilisation of dirty energies (SDG15). Organic fertilizers can increase the productivity of farmers, which allows them to switch to higher end crops translating into higher incomes (SDG8). These case study also aims to provide farmers with renewable energy (SDG7), reduce firewood collection hence removing the burden from women and children who usually are responsible for it (SDG5), improve product sustainability value (SDG12), reduce the impact of indoor house pollution (SDG3), and greenhouse gas emissions (SDG13).

Lessons learnt and key takes

Working locally, and maintaining all relevant stakeholders, such as farmers, government officials, private sector, informed is key to building trustworthy and durable relationships along the project. A well-defined business model along with keeping a local approach is an important consideration to increase the project's scalability and sustainability.

Currently, the project team is working towards developing a more robust bio digester system, to provide a better economic feasibility for the farmers, aiming to increase production quality and product's value. The team is also working on raising awareness about sustainable consumption and production of agriculture commodities. Furthermore, the team is exploring other crops and products, such as cacao to create a chocolate filled with crushed coffee beans.

As a way forward, the project is going to be replicated outside of Bali, reaching out East Nusa Tengara, another highly vulnerable province on the eastern parts of Indonesia. On a bigger scale, this case is recognised as a successful pilot project to be scaled further with the help of national and regional stakeholders' network.

Information

su-re.co (Sustainability and Resilience Co)
http://su-re.co / info@su-re.co
Jl. Dalem Gede No. 25, Pererenan, Mengwi, Badung, Bali, Indonesia 80351

Project information

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Contact

Jochen Hinkel (project coordinator), Global Climate Forum (GCF), Germany, hinkel@globalclimateforum.org
www.green-win-project.eu

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