Essay on Development Policy

„Climate Field Schools" – A Suitable Approach for Climate Change Adaptation?

The Indonesian Case

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Abbreviations

ADPC - ASEAN Disaster Preparedness Center

BMKG - Badan Meterologi, Klimatology, dan Geofisika (National Climate and Weather Services Indonesia)

CC – Climate Change

CFS - Climate Field Schools

CGIAR - Consultative Group on International Agricultural Research

ENSO - El Niño-Southern Oscillation

GHG - Greenhouse Gas

GIZ – Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH

IPB – Institute Pertanian Bogor (Agricultural University Bogor)

IPM - Integrated Pest Management

BPdP – Badan Penelitian dan Pengembangan (agricultural research institute)

MA - Ministry of Agriculture

SFS – Science Field Shops

USAID – U.S. Agency for International Development

1 Introduction

“Men argue. Nature acts.” — Voltaire

Climate change (CC) is a big challenge for farmers all over the world. While farmers have always responded to climatic variability, CC complicates matters. Supporting and empowering farmers to adapt to this new and dynamic challenge is thus crucial to guarantee future food security and sustain rural livelihoods. Development cooperation can and has to play an active role in doing so.

This essay looks at Indonesia which is especially vulnerable to CC and shows well the complexity of the task. Also, Indonesia has to share long term experiences made with one particular approach to support smallholder farmers to increase their climate resilience: the Climate Field Schools (CFS).

In the following, the concept and the experiences after 10 years of implementation of these CFS are explained and critically reflected. Ultimately necessary improvements and the general usefulness of the approach for development cooperation are discussed.

2 Agriculture and climate change in Indonesia

"Farming is a profession of hope" — Brian Brett

Communities across the world are facing the impacts of CC and are well aware of this fact. As results from a 2012 survey show, this also holds true for Indonesia which is particularly vulnerable to CC due to its island location:

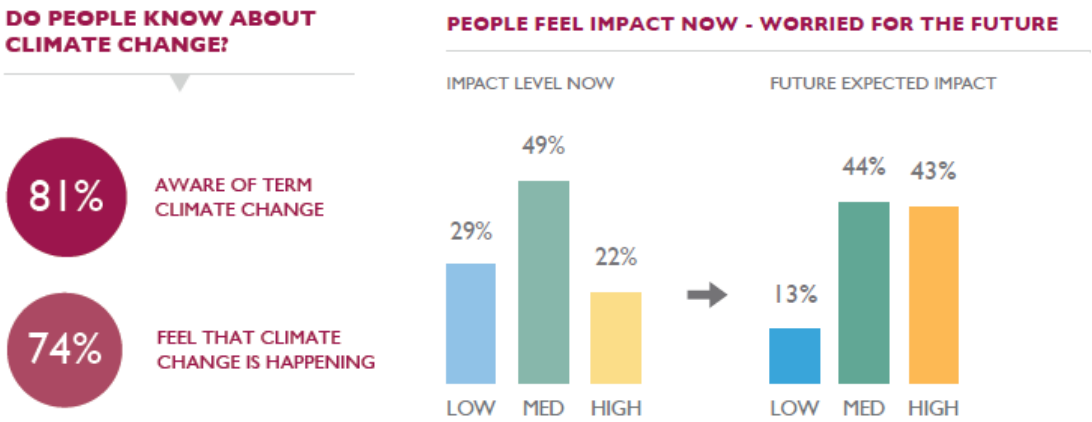

Figure 1: CC awareness of Indonesians (Climateasia, 2012)

Agriculture is of central importance in Indonesia, contributing 14.7% to the GDP and employing 33% of the labor force while being the main income source for 70% of the rural households. It is the world's 10th largest agriculture and its 3rd largest rice producer as well as main corn producer of Asia (Haryono, 2013).

The Indonesian climate is dominated by the monsoon, leading to basically two seasons, the rainy season and the dry season. The huge dimension of the country extending over 5000km from east to west with vast surrounding oceans with complex currents leads to locally strongly varying climates. Adding up to the complexity is the strong influence of macroclimatic systems, in particular the El Niño-Southern Oscillation (ENSO) dynamics, bringing rather draughts (El Niño) or wet dry seasons (La Niña). The following figure gives an indication of the very complex, heterogeneous climate regions.

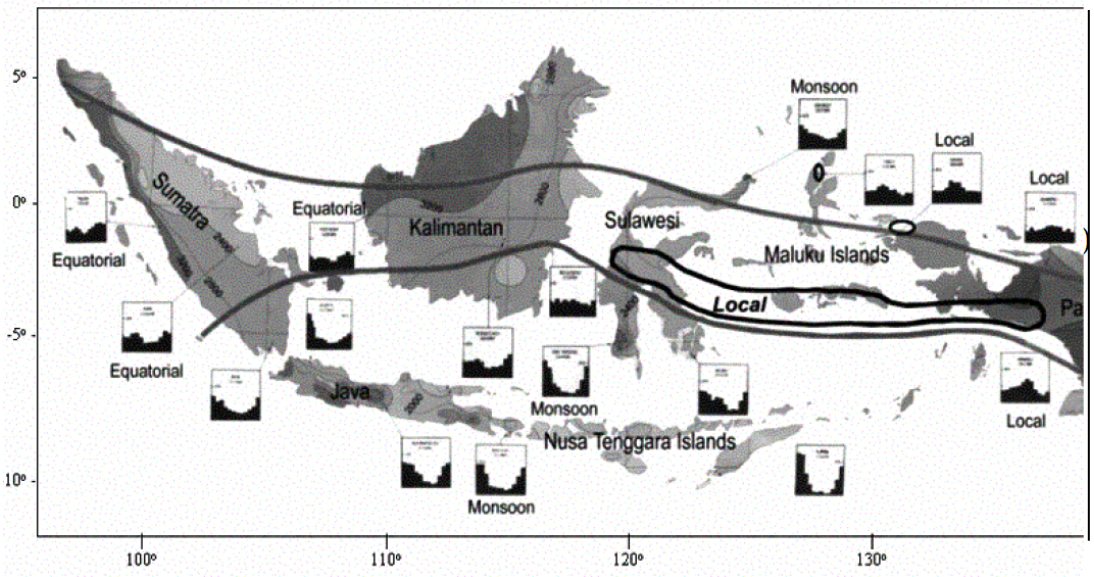

Figure 2: Indonesian climate regions (Boer, 2013a)

Increased rainfall variability, irregular monsoon seasons, average temperature increase and the increasing frequency and intensity of extreme events has been observed lately. These phenomena are most likely connected to CC and are predicted to become stronger in the future (e.g. Winarto et al. 2008). Combined with the forces of ENSO strong and not entirely foreseeable effects on agriculture are likely (Stigter et al., 2012b).

Under these premises simple national top-down solutions and recipes do not work, as every region, every island and often every community has to deal with a different set of CC impacts.

Farmers' practices on the other side are based on long-term experience which rests upon a more or less stable bandwidth of events and low frequency of disasters. Fundamental changes are not part of their response to the "common" climate variability. The biggest new, CC challenge for farmers is the increased variability of rainfall caused by the changing of the rainy seasons. In Java for example, the rainy season seems to start later and stop earlier, while the amount of rain remains roughly the same. False starts into the rainy season and unusual dry periods in the middle of a rainy season make things even more difficult. Finding the appropriate planting time becomes extremely challenging, traditional calendars lose their reliability. Other big challenges are flooding, damages through storms and sea level rise. Noteworthy is

also the expected increase in night temperatures, which decreases rice yields of the presently used rice varieties (Stigter et al., 2012a).

The good news is, that according to an analysis of the current state of affairs by Stigter et al. (2013b) “the adverse effects of CC can largely be handled…and efforts to develop and apply technology to do so are under way.” One central recommendation found in all of the numerous studies and literature reviews looking at CC and adaptation is to strengthen farmer’s awareness and capacities to cope with CC (e.g. Stigter et al., 2012b; Ketelaar, 2013). First of all, farmers need to be aware of the changes in order to adapt behavior that was good advice during centuries before and then need support in finding solutions. Figure 3 shows exemplarily how badly Indonesian are prepared to cope with e.g. extreme weather. The following chapter will thus take a closer look at one possible instrument to support farmers in this issue: Climate Field Schools.

Figure 3: CC preparedness of Indonesians (Climateasia, 2012)

3 Field Schools

“Experience is a good school. But the fees are high” — Heinrich Heine

3.1 Farmer Field Schools

Access to information is a crucial asset in the livelihoods of smallholders and often an elemental shortcoming, as only information permits to use the other assets efficiently. One successfully applied channel to deliver information and make it understandable are Farmer Field Schools, consisting of groups of people who get together on a regular basis to study the “how and why” of a particular topic (Gallagher, 2003). The focus lies on field studies which are backed up by a facilitator leading through the exercises. Another central element is a curriculum which is synchronized with the natural cycle of its subject. Specific practical skills and conceptual understanding is thus taught in order to learn complex management skills and evidence-based decision making through observation and analysis. Indonesia has conducted such farmer field schools on Integrated Pest Management (IPM) since the 80ies.

Figure 4: “Energizer” during a field school in Gunung Kidul, Java.

3.2 Climate Field Schools

3.2.1 Indonesia

In 2005 Indonesia started to conduct “sekolah lapangan iklim” (Climate Field Schools, CFS), building on the “highly successful” (Winarto et al., 2008) Farmer Field School approach by using the already existing extension mechanism. The basic idea of CFS is to disseminate weather and climate information to farmers by “translating the information from scientific language into field language and then translating field language into farmers’ language…” (Boer et al. 2004). Farmers, in particular smallholders, are empowered to better cope with climate shocks, better manage climate related risks and become more climate resilient. Their farming practices and decisions shall be based on observations in combination with latest scientific knowledge leading to the so called “response farming”. For this purpose CFS create a continuous process of learning.

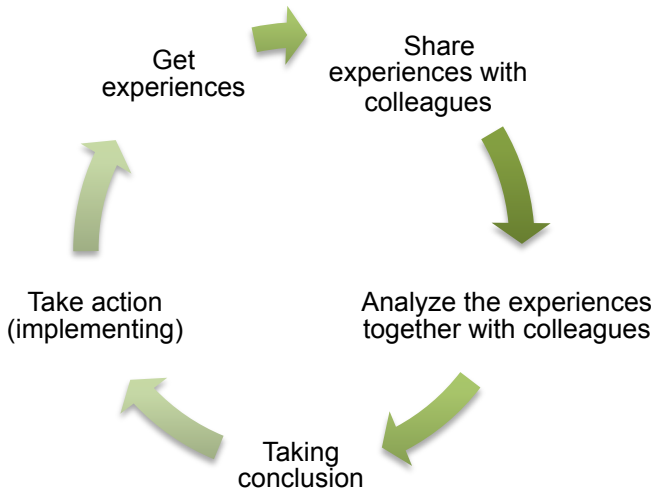

Figure 5: Continuous learning process, adapted from (Boer, 2013a)

All content is taught in a playful form of game or simulation much more suitable to farmers, which are not experienced in our classic way of teaching and learning. (Winarto et al., 2008). Also dynamic group exercises to promote leadership, creativity and team work are hold as well as the facilitation of mutual learning through farmer networks. CFS aim to “change knowledge…, which in the long term should also change behavior of people, but in a non-directed, independent way” (Stigter et al., 2013b).

The first pilots that integrated CC aspects into IPM schools from 2003 were funded by USAID via the ASEAN Disaster Preparedness Center (ADPC). The concept then was further refined by the University of Agriculture in Bogor (IPB) and the Indonesian Ministry of Agriculture (MA) in cooperation with the Indonesian Agency for Meteorology (BMKG), still financed by ADPC. The first CFS was set up in 2005 in Indramayu, West Java. In 2007 a second site was set up in Gunung Kidul and subsequently many others followed. In the process, independent spin-offs from the main concept have been implemented. The focus of this essay lies on the official CFS conducted the MA. Between 2007 and 2012 941 CFS courses with each 30 farmers each have been conducted, reaching a total of 28'230 farmers. At the moment the CFS are still regionally restricted to Java and focus on rice. It is planned to extend them to other areas and additional crops (Boer et al.. 2003; 2004; Winarto et al. 2008; Subbiah 2006).

Figure 6: Y axis: number of CFS conducted, x-axis year (from Boer, 2013a)

The simplified organizational structure of the CFS is as follows:

University /Science/ MA

↓

PL 1 (Trainer of Trainers, extension workers)

↓

PL 2 (Field facilitator)

↓

Farmers

Exchange of experiences, discussion of possible improvements and further development of the CFS curricula and modules take place in the Climate School Forum (CSF). Participants are Trainer of Trainers (PL 1) and Field Facilitators (PL 2), the heads of the provincial pest and diseases observation agencies and scientists from IPB. The CSF also deal with refining the content of the CFS curricula to site specific challenges such as best practices, new crops, etc. and completely new modules. So far the CSF took place 4 times, lastly in 2013 in Sulawesi.

3.2.2 CFS Content

The focus of the CFS lies on increasing awareness and understanding of CC and teaching the use of weather and climate information. It is part of the discipline of agrometeorology and is, according to Stigter (2013d) and WMO (2011) one of its most important trends. Concretely the following activities are conducted (from various sources e.g. Boer et al,. 2003; Winarto et al. 2008; Stigter et al., 2012b; Boer, 2009).

The first module delivers **basic information on CC** such as e.g. terminology, cause and effects, differentiation between weather and climate, etc. Farmers learn what they have to expect for the future and the latest climate forecast products are explained. This is a frequently expressed need by the farmers and can help them a lot to feel more secure (Winarto et al., 2009).

Measuring rainfall with simple, handmade rain gauges and learning to take notes and keeping records is the basic method and the foundation to discuss CC. Farmers learn to see small scale differences in rainfall and observing the agronomical consequences. Also, the measurements will allow the farmers to give qualified feedback to BMKG about the quality of the weather forecasts and climate predictions, facilitating eventually their improvement.

The second module and central element is on the use of **weather and climate information**. The basic elements of climate predictions and weather forecasts such as probability concept, terminology etc. are explained. Simple, localized seasonal climate predictions informing about the onset of dry and wet season and total rainfall compared to average are provided, discussed and interpreted. They are based on the long term ENSO forecasts and can be given one month ahead of the season.

Subsequently monthly updated forecasts about rainfall are given and verified by the farmers with their own measurements and notes. This information ultimately helps farmers to take better, evidence-based decisions on what and when to plant and thinking about improved, better suited farming practices and adaptation options.

Thirdly, **soil & water management practices** are part of the CFS. According to the expected and observed changes in rainfall patterns these can be improved, by taking measures to prevent water logging and flooding of the fields as well as finding opportunities for rainwater harvesting, water storage and irrigation. For example, farmers in Gunung Kidul found by comparing their yields in field experiments, that ridges show a positive effect, especially to cope with the increasing dry periods during the rainy season.

Prospective, many other aspects are planned to be integrated. Optimally **the traditional seasonal calendar** can be adapted through local experiments by combining new with traditional information such as for example traditional indicators for the beginning of the rainy season like falling leaves, singing birds or noisy insects. The whole **cropping strategy** and the **choice of crops and varieties** could be improved and better adapted to the expected long-term changes. Other issues that could be integrated are **pests & diseases**, **early warning systems** and other **disaster preparedness attempts** as well as GHG **mitigation** measures.

4 Reality check

One major conclusion is that CC gives just one more reason to increase the resilience of farmers' livelihoods. Topics such as soil and water management, pests and diseases, seeds and crop selection are important issues irrespective of CC. "Ultimately only the complete livelihood approach counts for farmers" (Winarto et al., 2009). An important achievement of the CFS is that they facilitate cooperation between very different actors that usually do not interact that much, such as for example agricultural stakeholders and with people from the field of CC/ meteorology (Stigter et al. 2013b). Exchange among the farmers themselves is also facilitated. Conceptually CFS seem to be a very useful instrument.

However opinions on the achievements after 10 years of Indonesian CFS are diverging, with objective and quantitative evaluations of the outcomes missing. This essay's discussion bases therefore on numerous publications on the issue coming from mainly two different proponents assessing the success very differently: Boer and his colleagues and C. Stigter & Y. Winarto and others. A central part of the debate seems to be between the actual implementation of the concept into an existing Indonesian administrative system with all its restrictions and flaws as done by Boer et al. and a theoretically and conceptually perfect concept which however has not been implemented in a broad way (Stigter et al.).

Boer et al. are, with limitations, positive about the achievements of the CFS so far and optimistic when looking at CFS' future potential. Stigter et al. on the other side, are much more skeptical observing an "…apparent failure of the presently relatively large-scale CFS approach in Indonesia…" with an "…absence of any systematical use of seasonal climate predictions by farmers" (Stigter et al., 2012b). They criticize that "…the CFSs as tried out in Indonesia…had actually become teaching practices instead of services" (Stigter et al., 2013b). .Siregar et al. (2011) come to a similar conclusion, stating that "five years after the CFS, use of climate information is still virtually nonexistent".

In the following the main difficulties and shortcomings discussed are briefly listed:

Institutional/ human resources:

- Complex institutional realities are hampering the efficient implementation and are also the reason for the complex administrative structure of the CFS. Responsibilities are compartmented and collaboration on a cross-cutting issue with two different Ministries being responsible for either CC (environment) and agriculture, is difficult. Furthermore the extension system is administered and organized nationally but then conducted on provincial level without providing usable contents to the extension officers. These difficulties are according to Boer (2013b) the one of the main reasons for shortcomings criticized by Stigter et al. and the slow progress and improvements in Indonesian CFS.
- The prerequisite for a successful CFS are good extension services which can be used for the actual implementation. However these "…are very often virtually absent and where they still do exist they are badly trained…" (Stigter et al., 2012b & 2013b). There is a general lack of CC specific knowledge in extension work (Ruhimat, 2013; Stigter et al. 2012a), the general CC information is not well enough explained (Winarto et al., 2009)
    - Trainer of trainers (PL 1) who have good knowledge about CC are very limited. "We have noted a gap in PL 1 for such CFSs" (Stigter et al., 2011).
    - The extension workers effectively conducting the CFS (PL 2) are often basically doing the same as in the IPM farmer field schools, due to lack of education. As Stigter puts it very explicitly: "…they forgot to properly train the trainers" (Stigter 2013d)
- Finding good extension workers is essential and very challenging as the most capable and educated farmers that would ideally fit the requirements of the extension job, find more attractive and better paid jobs in other areas and quit extension (May et al 2013, Ruhimat, 2013). So the extension workers are too few in numbers. The national budgets are insufficient; agriculture still has a too low priority (Boer, 2009).
- The institutional capacities of the agricultural and meteorological administrations are low but an important prerequisite as the first (of three) theorems of agrometeorological extension is: "Extension training should start at the institutions that deliver the agrometeorological and agroclimatological products..." (May et al. 2013).

- There are too many uncoordinated efforts in the area of CC and agriculture from all kind of actors, everyone fighting a similar cause but doing it independently. For instance besides the CFS by the MA, others such as BMKG, Dpt. of Horticulture in collaboration with different Universities have started their own “CFS” without coordinating.
- The government’s main objective and policy is on maximum productivity under consideration of all means (pesticides, private sector promotion), with less focus and effort to support and capacitate smallholder farmers and investing in sustainable agriculture (Stigter et al., 2012b).
- A non-Indonesia specific problem is that CC experts often do not know what is needed on grassroot level while people working on grassroot level do not know the latest CC and agrometeorological achievements (Stigter et al., 2012b).

Content:

- Content wise the CFS are criticized as being too scholarly, containing too little participatory elements and being conducted too much top down (May et al. 2013; Stigter, 2013d). This weakness is also acknowledged by Boer et al., noting that this is the great challenge which is not solved yet in the centralistic Indonesian system (Boer 2013b). The discussion on how much must be defined on national level and how much flexibility can be given is ongoing. Stigter et al. (2012a) meanwhile even favor and promote to have no curricula at all and only invest in very good PL1 trainers who then define CFS contents together with the farmers.
- The development of the curricula is very work and time intensive, building a new crop specific module is challenging, often the curricula even have to be site specific. According to Boer et al. this is the main challenge. Building the CFS curricula needs much time and effort and it is unclear if the system is fast, flexible and adaptive enough to implement new findings. Also adapting to local specifications requires a lot of skills by the people conducting CFS.
- No monitoring and evaluation system nor other systems for improvements such as feedback loops are in place yet, making objective opinion building, adjustments and improvements difficult.

Climate predictions & weather forecasts:

- Another difficulty lies in the weather and climate information itself. It is difficult to assess the actual quality of the predictions and their potential. Some people state that technology is now capable of predicting conditions of a season 2-6 months in advance (Boer, 2009). Stigter et al are more skeptical that the climate projections in the near future cannot "…be done with the necessary accuracy for decision making on adaption to CC..." (Stigter et al. 2013c). However, useful projections on the most likely start of the main rainy season and an indication if the precipitation will be above or below average are available on a monthly base, based on the raw climate prediction information from ENSO. The implementation of this information has been tried for Indramayu but it has still to be institutionalized and upgraded (Boer, 2013b; Stigter, 2013d).
- The situation with the weather forecast is similar. Farmers have not much trust in the actual forecasts and BMKG obtain not much feedback on the quality of their weather and seasonal forecasts for the various Indonesian regions (Boer, 2013b). Also the missing information about the reliability of the forecasts hampers proper planning of CFS, as the idea was to start CFS in areas where already good forecasts are available.

5 Conclusion

As many publications and workshops mutually emphasize, FFS are a very well suited instrument for capacitating farmers "…and have a proven track record of farmer empowerment at community level in South and Southeast Asia" (Ketelaar, 2013). Integrating CC, in particular the use of climate projections and weather forecasts, into CFS is a very important and promising adaptation intervention. A review through CGIAR's research programme on CC, Agriculture and Food Security (CCAFS) also states that there is "…a big need of a better integration of climate information services into decision-making at the local level" (May, 2013). The ASEAN-FAO-GIZ Expert Forum on CC, Agriculture and Food Security also made the same point and presented Indonesia as a good example. "The case is made for more emphasis on rural community education and participatory training through FFS in donor-assisted CC mitigation and adaptation projects…" (Ketelaar, 2013). It is not only a good instrument, but due to the low existing capacities in Indonesia also very badly needed (Stigter et al. 2012a; Winarto, 2010).

For all these advantages the actual implementation of CFS in Indonesia is not without critics and faces many challenges as described in Chapter 4.

The main critic, that the CFS system and its content are too rigid and taught in "lecture style seminars" instead of a flexible, participatory, learning by doing way, is identified by the responsible institutions and efforts are made to improve. In particular a better integration of the basis, field facilitators and indirectly farmers into the CSF is initiated. Establishing a set of guidelines and considerations to be referred to, rather than strict and fix top down instruction / curricula, must be the objective and will decide on the success of the CFS.

The other big critic and challenge is the insufficient training and motivation of the intermediaries, the extension workers (PL1 and PL2) who seem too often to be neglected. The importance of the farmers' creative adaptive capacities and socio-cultural institutions and the necessity to take them into account to provide good extension service hasn't been appreciated enough (Stigter et al., 2012a). Public extension services have been abandoned and the field has been left on local level to NGOs. This is changing and the importance - especially under the food security discussion - is increasing again. However the field cannot just be left to the private

sector promoting their solutions, but farmers need to be integrated in these activities, their traditional knowledge and knowhow must be integrated. In order to deliver good extension services Indonesia has to allocate sufficient resources. Addressing this gap is key for a successful implementation of the CFS and primarily needs to be addressed on governmental level. Development actors wanting to support strengthen agriculture and work on CC adaptation should start there.

In their latest publications Stigter et al. (2012a; 2012b; 2013c; 2013b) propose Science Field Shops (SFS) to overcome the institutional and personal challenges encountered in Indonesia's' extension system. SFS are basically open learning and exchange meetings on the CFS topics between scholars, scientists, farmers and extension intermediaries, representing a "less top down, farmer first approach". They have no curricula and the farmers determine the content. SFS are also meant to generate feedback and input for improving the curricula of the existing CFS. Since 2009 several SFS pilots have been conducted by Stigter et al. Also, SFS are reported to be most useful to back up well-educated extension intermediaries and thus address one of the CFS' biggest shortcomings. They seem to be a promising and helpful approach to close the gap between the claim of the CFS and reality, helping to determine how open and flexible future CFS curricula should be. Besides the strengthening of the farmers, institutional capacity building is likewise badly needed on national as well as on provincial level.

One big flaw is actually being addressed as the CFS forum decided in 2013 to put a monitoring and evaluation system in place. Indicators such as "use of climate information", "selling of rain gauges" and others will help to measure impact and will provide the government and eventual donors a more objective view on the impact of the CFS.

Development interventions that aim to reduce the vulnerability of the agricultural sector and improve food security should strongly consider using the CFS approach. There is no need of further stocktaking, review papers, general adaptation concepts and high-flying position papers but there is need in action. The options and possibilities are known. The existing CFS in Indonesia need to be improved and financially strengthened by a coordinated aligned approach of the donors working on CC and agriculture. Good donor coordination in the field of CC and agriculture is challenging and a crucial task for the Indonesian government. Another important task

is to reduce the institutional obstacles for a cross cutting issue such as CC and agriculture/food. The Indonesian government is doing well by trying to establish and strengthening a national mechanism to do so but should try to integrate the experiences and inputs from other pilot approaches such as the SFS. Important is also that the different actors presented in this essay, in particular Boer et al. and Stigter et al., cooperate in a constructive way as they are all ultimately fighting for the same cause. If the CFS become successful, a big step towards more climate resiliency, increased food security and strengthened rural livelihoods is made.

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