Institutionalizing Climate Information Applications: Indonesian Case

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Abstract

At present, the use of climate (forecast) information is minimal. At Indramayu, a district vulnerable to El Niño/Southern Oscillation (ENSO) events, farmers are always suffering from drought and flood whenever El Niño and La Niña occur. Some of the reasons are that end-users (farmers) have difficulty in understanding climate forecast information that contains probability, and there is no effective dissemination system of climate forecast information to end-users. Farmers are also not aware of the economic value of climate forecast information. As a consequence, the level of farmers' adoption to climate forecast information is minimal and they have no capacity to tailor their cropping strategy to climate forecasts. To increase farmers' adoption to climate forecast information, their knowledge of climate and its application should be improved. A process called Climate Field School (CFS) is introduced to increase farmers' knowledge on climate information application. The basic concept of CFS is to disseminate climate information applications to end users by translating the information from scientific language into field language and then translating field language into farmers' language through field school. Based on the result of the evaluation, it was indicated that the CFS might be an effective way to educate farmers (end-users) on climate information application. The main challenge in the implementation of CFS is the development of modules. This paper discusses briefly the concept of CFS and its implementation at Indramayu.

Introduction

Climate information systems must ensure that tailored climate information to users' needs should get into the hands of the users in a timely fashion in order to have some influence on practical decisions. There would not be much benefit for society if the results of climate applications research remain in the academic or research area. Considerable efforts are required to develop the appropriate means for the effective dissemination of the climate information to users.

Asian Disaster Preparedness Centre (ADPC) has a long experience in southern and southeastern Asia regions to institutionalize climate information application for many sectors, specifically in the agriculture sector. Observation in many countries showed that the agriculture sector has been found to be the most vulnerable sector to extreme climate events. The significant reduction in crop production was always observed whenever extreme climate events occurred. Some of the important reasons that caused this condition are: 1) end-users have difficulty understanding climate forecast information that contains probability; 2) there is no effective dissemination system of the climate information to the users; 3) there is a low capacity of users in translating climate forecast information for practical use; and, 4) the end-users (farmers) are not aware of the economic value of climate forecast information (Boer

and Setyadipratikto, 2003). In many cases, the end users will seek the information and use it when it will provide benefits.

Considering the above conditions, the production of seasonal climate forecasts should not be considered as the end results of a climate forecast system. It is only one of the early links in a long chain of tailored climate information and forecast products that should be fed into a Climate Information System (Ropelewski and Lyon, 2003). Thus, the results of the climate forecasts and other climate information should be delivered to intermediate- and end-users through a number of appropriate means and various institutional channels.

The appropriate means for disseminating climate information to users may include sophisticated technologies such as Internet or direct satellite links, and some other ways that are not required or less dependent on advanced technologies such as radio, newsletter, education materials, and local civic meetings. This paper provides a brief report of the ADPC project in Indonesia on the development of the institutional system for disseminating climate information to end-users, specifically farmers.

Site for Implementation of the ADPC Project

The selection of sites for the implementation of the project is one of the important steps that may determine the success of the project. In the ADPC project, the selection of project sites was based on: 1) the level of vulnerability of the site to the extreme climate events; 2) status of incorporating climate variability concerns in agriculture planning (e.g., crop-planning cycle) and support from local government; 3) demand and acceptability of probabilistic forecast at farmer's level; 4) potential applicability of pilot project to other location; and, 5) availability of historical database and institutional arrangements at the district level to implement the project. Considering these factors, Indramayu, a district in West Java Province, has been selected for the ADPC project.

Indramayu is one of the districts in West Java Province that is very vulnerable to extreme climate events associated with ENSO. Observations from 1991-1997 showed that this district was always suffering from drought whenever El Niño occurred. The impact on the community's income was very significant. The proportion of the population under the poverty line increased significantly during El Niño years (Figure 1). Rainfall station networks are also quite good. However, the transfer of the recorded data to data analysis centers is not smooth. In addition, the local government has provided greater attention to the climate hazards even though the efforts are more responsive than preventive.

The institutional process for disseminating climate forecast information at Indramayu district follows the process presented in Figure 2. Information such as extreme climate forecast or new technology issued by related agencies is passed to the head of the districts (Bupati) or head of the district offices (Kepala Dinas) either in the coordination meeting held at the Province or directly from the source agencies such as the Bureau of Meteorology and Geophysics (BMG). In the case of extreme climate events, the Bupati issues instructions to the head of the District Agriculture Office. The head of the District Agriculture Office coordinates with other district offices to implement the instructions. The agriculture office issues an operational guidance (e.g., steps or actions that should be taken in the field) to anticipate the events. This guidance is passed to the head of the sub-districts or coordinator of the extension workers and they pass it to the heads of the village or farmer groups. In some cases, the head of the agriculture office can directly contact the head of the village for

implementing the Bupati instructions if human resources at sub-districts level are limited. The extension workers can conduct activities for farmers and farm leaders. For locations where the water becomes very limited during the El Niño events, the District Government (Pemda) through the Agriculture Office provides the farmers with a soil water pumping facility and renovates the irrigation canals.

Because most of the criteria defined above were already met in Indramayu, the district could be representative of the climate anomaly in almost the entire island of Java, and the experiences gained in this district on the use of climate information for reducing the vulnerability of rice-based farming systems to ECE could be replicated elsewhere. Therefore, this district was selected for the pilot phase (First Phase). The project specifically aimed to: 1) provide locally relevant climate information in advance to enable decision-making; 2) conduct training to enable staff of the agriculture office and extension workers to communicate probabilistic forecast information to the farmers and other end-users; 3) increase capability of the local agriculture staff and extension workers to use climate forecast information for suggesting cropping management strategies; 4) evaluate farmers' responses to climate forecast information; and, 5) refine the provision of climate information for future use by farmers and other end-users based on the evaluation.

For the second phase, the project is designed to: 1) assist local institutions, farmers, and other end users to apply climate forecast information for reducing impact of floods and droughts; and, 2) promote a sustainable institutional mechanism for application of climate information.

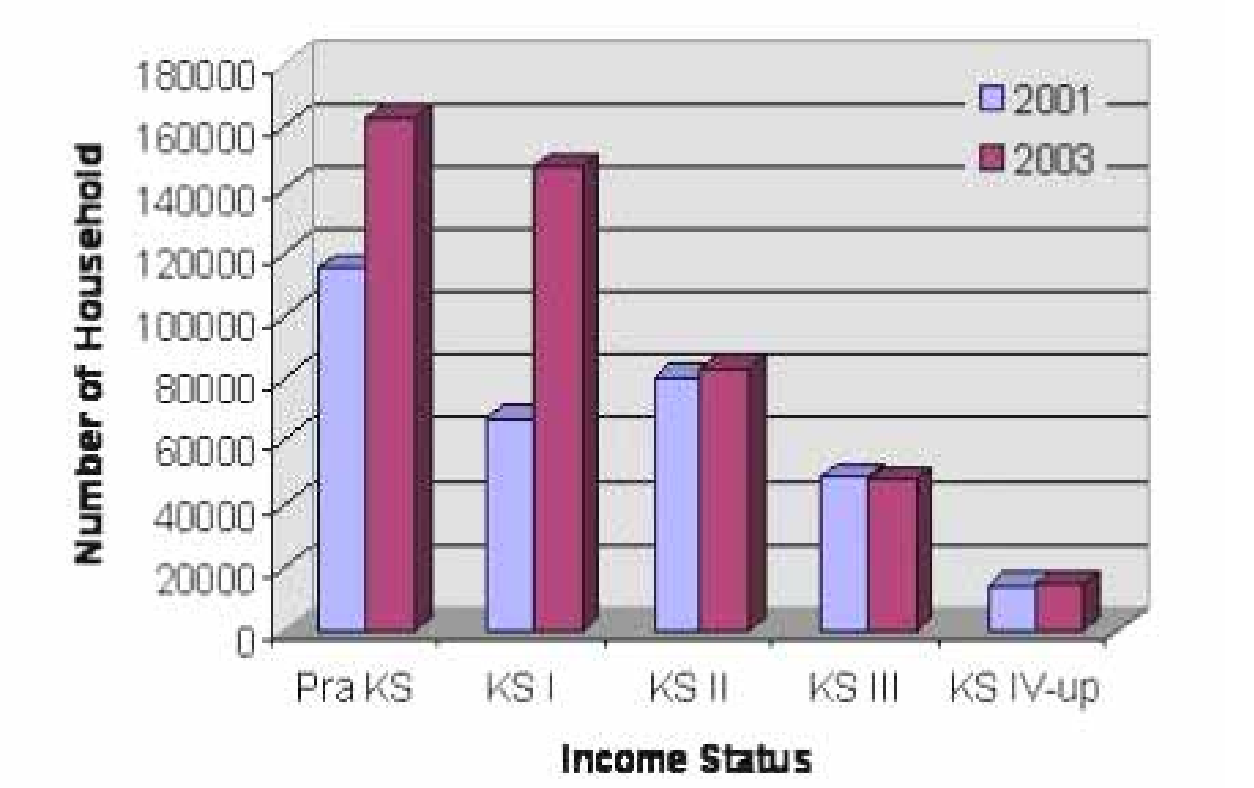

Figure 1. Number of households based on income status in non-El Niño years (01) and El Niño years (03).
(Note: Pra-KS and KS1 are households with income below the poverty line.)

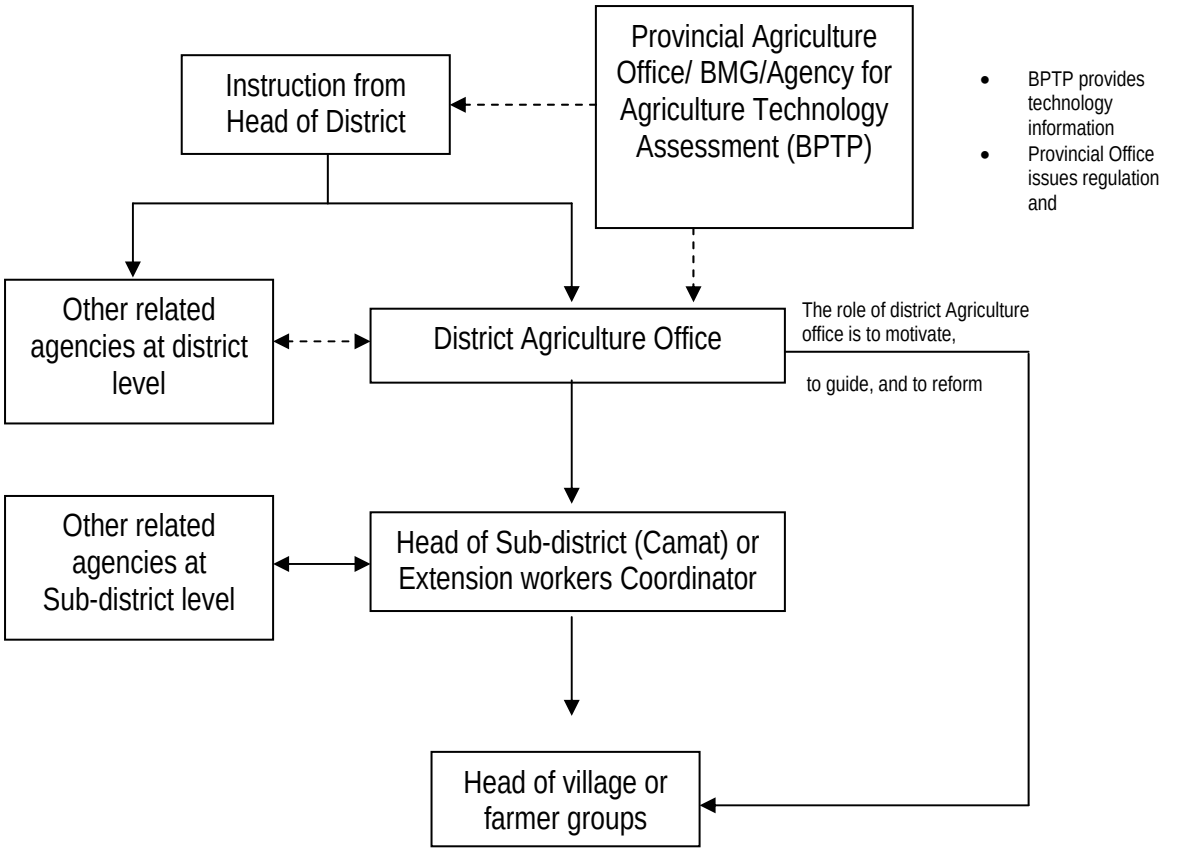

Figure 2. Flow of technologies or district instructions to farmers.

Implementation of the ADPC Project

For the pilot phase, because the nature of the project is mainly research, the implementation of the project was coordinated by Bogor Agricultural University (IPB) in collaboration with the Agriculture Office of Indramayu District (IAO), BMG, and the Directorate of Plant Protection Department of Agriculture (DITLIN). As the components of the project move into the operational stage, coordination of the project will be taken over by related government agencies, namely the BMG and DITLIN.

In line with the specific objectives, the component activities of the pilot project were divided into three main activities, namely: 1) provision of climate outlook, which is the responsibility of the BMG; 2) translation of climate outlook into impact outlook and crop management strategies, which is the responsibility of IPB in collaboration with IAO and DITLIN; and, 3) dissemination of the recommended crop management strategies to farmers, as well as its evaluation, which is the responsibility of IAO. In the second phase, it is expected that the role of university and research agencies will be to provide advice on new climate information applications.

In order to increase the level of adoption by farmers to climate forecasts and its use for tailoring their cropping system, the knowledge of farmers on climate information application needs to be improved. The use of the field school approach for improving farmers' knowledge on climate information application might be effective. This approach was successful in improving Indonesian farmers' knowledge on the integrated pest management (Warsiah et al., 1999). After the implementation of this program, pest and disease outbreaks

can be reduced significantly. Therefore, a program called Climate Field School (CFS) was introduced by the project. The following section describes briefly the implementation of CFS at Indramayu.

Improving Farmers' Knowledge on Climate Information Application

The idea of using the CFS approach is that the process for the dissemination of climate information to farmers should be similar to the process of introducing new technologies. Farmers should be convinced that the use of climate forecast information would benefit them and increase resilience to the extreme climate events (Boer, et al., 2003). Thus, in the CFS, all training modules are given in the form of a game or simulation. Materials used for developing the games were taken as much as possible from farmers' experiences. This is intended to relate the participants to the process of learning by practical experience. In other words, the CFS is a continuous process, i.e., getting experiences from doing, discussing, or explaining the experiences to colleagues, analyzing the experience together, formulating conclusions, and taking action (implementing) and then gaining new experiences from the action taken (Figure 3). All the processes are facilitated by Field Facilitators (extension workers or farmer leaders).

The basic concept of CFS is to disseminate climate information applications to end users by translating the information from scientific language into field language by the Field Facilitator-1 (extension worker specialists); and then translating it into farmer language by extension workers called Field Facilitator-2 in the form of a field school (for details see Boer, et al., 2003). Thus, the Field Facilitator-2 requires modules that translate climate knowledge and information into field language for guidance during the implementation of the CFS.

The development of modules will require a good understanding of developers on climate information applications, and good knowledge on agriculture systems, and climate-related problems at the sites. This will enable module developers to provide examples of simulations in the modules that are relevant to the site conditions or farmers' problems. Thus, development of the modules may require intensive discussion among module developers, the Field Facilitator-1, and local authorities. A series of modules should be developed in such a way that the final objective of the CFS could be achieved. The final objectives of the CFS is to form farmer groups that are strongly motivated to develop their own agribusiness activities where climate information is used as inputs for making plans, strategies, and decisions.

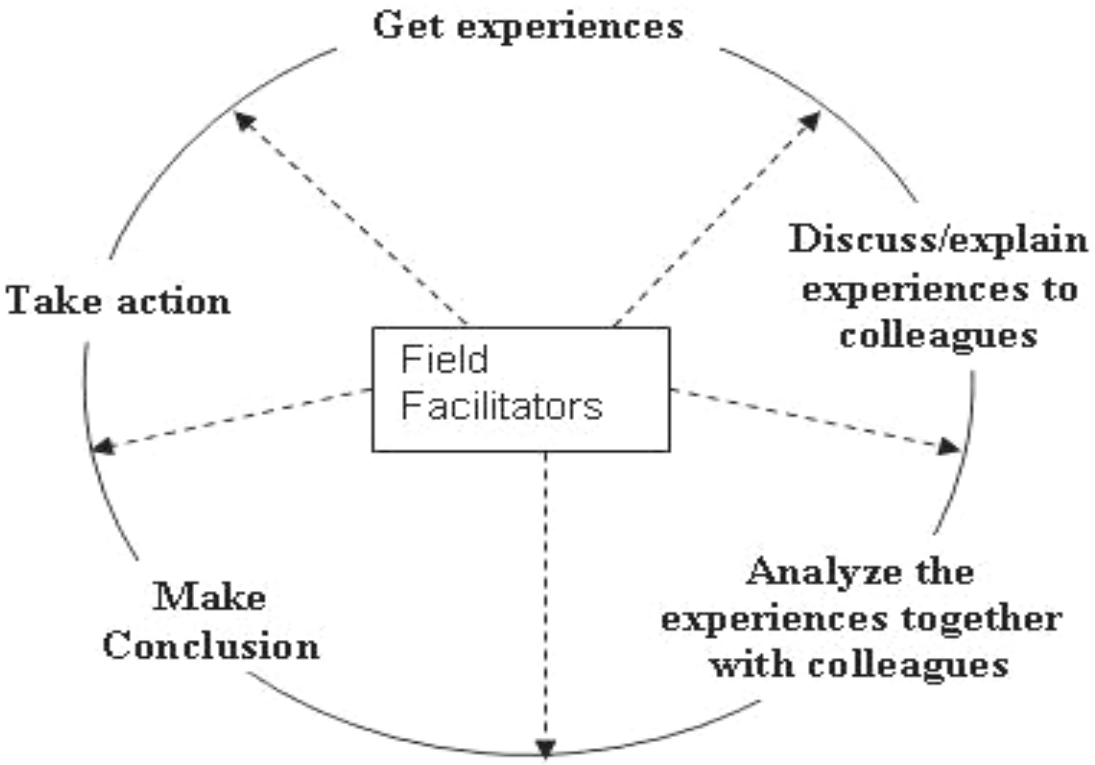

Figure 3. Process of Climate Field School (Adopted from Department Pertanian, 1998).

Based on the evaluation, it was indicated that the CFS was effective in improving farmers' understanding on climate information applications. Most of participants agreed that their knowledge on climate has increased. About 70 percent of the participants considered that their knowledge and understanding on weather and climate, their ability to use observed climatic data and climate forecast information to support farming activities, and their awareness on the importance of working in a group have significantly increased (Figure 4 and Table 1).

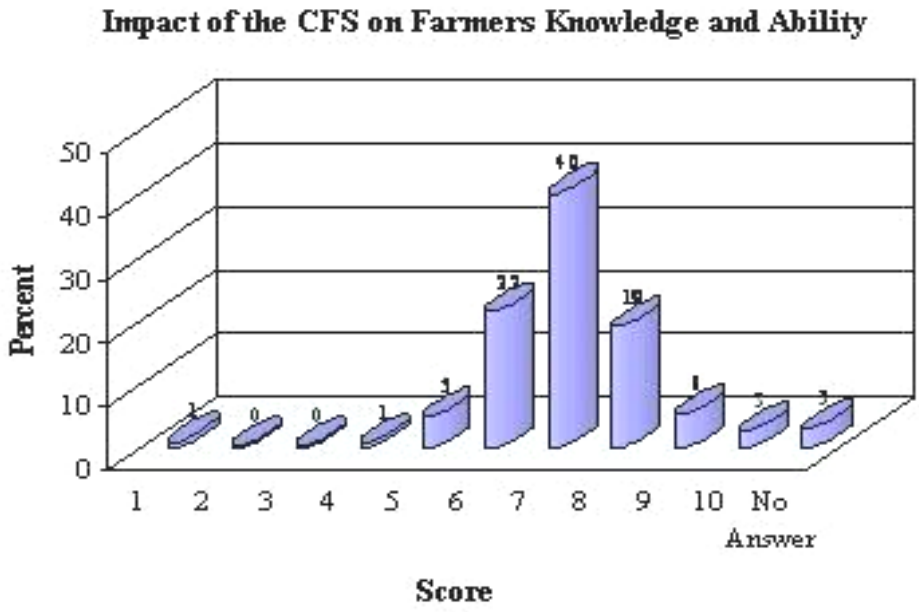

Figure 4. Result of evaluation of CFS program for improving farmers' knowledge on climate information application (ADPC, 2004).

Considering the final objective, the main challenge in the development of CFS programs is the development of modules that could cover not only climate information applications for on-farm activities but also for off-farm activities. On the other hand, how local government could also make use of climate information to support farmers' decisions and their off-farm activities is also another challenge.

Type of Ability	Score				Total
	7	8	9	10	
Knowledge and understanding about weather/climate towards agriculture	44	17	6	4	70.4
Making use of climatic data to support farming activities	31	30	7	2	70.4
Making use of results of BMG forecast to support farming activities	41	20	6	4	70.4
Making strategies to manage crops under extreme climate condition	46	7	4	2	59.3
Being aware of the role and good attitude for a group activity	41	20	6	6	72.2
Playing an effective role as a group member and being able to direct activities	37	22	7	2	68.5
Involving all the members of a group actively in activity	35	22	2	4	63.0
Giving and receiving response effectively and efficiently	44	22	2	0	68.5
Good knowledge of types of activities, facilities and methods to be applied in everyday work	41	13	11	2	66.7

Table 1. Percent of the participants that gave a score of 7-10 according to type of ability being evaluated.

Note: Score 10 is the highest, meaning the ability has improved or been well mastered.
Source: ADPC (2004). Fifty-four farmers were interviewed.

Agricultural development at Indramayu is directed at increasing and improving productivity, quality, and the production of agriculture commodities; creating more job opportunities in the villages; and increasing village community participation in private investments (agribusiness activities). The latter is aimed at enabling farmers to control off-farm systems. At present, farmers only control production systems (on-farm), while off-farm systems such as production and price of agriculture inputs and price of agriculture products are not controlled. The classic example is that farmers never receive high benefits when they have a surplus of production, since the price always decreases during peak planting seasons when the price of agricultural inputs has increased.

Considering the above conditions, policies of the government of Indramayu for agriculture development are divided into three parts (Regent of Indramayu, 2003): 1) programs to improve farm management system; 2) programs to improve agricultural institutional system; and, 3) programs to develop partnership systems for agribusiness activities.

Improvement of the farm-management system is conducted through a number of programs. The programs are: 1) technology improvements that include improvement of the dissemination system for selected and prioritized crop-management technologies to farmers through demonstration plots and farmer field schools and development of appropriate technologies (pre- and post-harvest technologies); 2) development of agroecological zones, or developing the region based on availability of agriculture facilities and resources potential; 3) crop selection system, where the selection of crops in a given season is expected to follow market condition and climate forecast.

Improvement of agricultural institutional systems at on-farm and off-farm systems consists of a number of programs. At on-farm systems, the programs aim to improve institutional

systems for disseminating agriculture technologies and market and climate information among farmers, between villages, between villages and sub-districts, and between villages, sub-districts, and the regency. At off-farm systems, the programs aim to develop and improve institutional systems that can help farmers to have good entrepreneurship either in upstream or downstream agribusiness systems. For an upstream system, the program includes development of a rural financial system and agricultural inputs businesses managed by farmers' group, etc.; and the downstream system includes development of post-harvest management systems (village ag. product storage system, etc.).

Programs for development of partnership systems for agribusiness activities are designed to achieve a number of objectives. The first objective is to increase the bargaining power of farmers though enhancing farmers' collaboration in managing their agribusiness activities. The second objective is to increase the quality of farmers' products and income through agribusiness collaboration between farmers' groups and private companies. The third objective is to enhance linkage between technology producers (universities and research agencies) and farmers' groups.

The challenge is how climate information can be applied in supporting the agricultural development at Indramayu. Figure 5 shows how climate information will be used in farm management systems, agricultural institutional systems, and partnership systems for agribusiness activities; and the roles of the government. Figure 5 implies that the role of the government in facilitating the process of improving farmers' knowledge and capacity to manage climate variability in on-farm and off-farm activities through CFS programs is still dominant, and then will gradually decrease as the program moves toward the development of a partnership system. At this stage, it is expected that farmers' groups have strong motivation and the capacity to develop their own agribusiness activities and to develop links or collaborate with the private sector. The role of local government will focus on issuing local regulations or decrees or new policies to support the farmers' agribusiness activities. The three programs could be done in sequence or in parallel depending on the condition of the villages or the sub-districts.

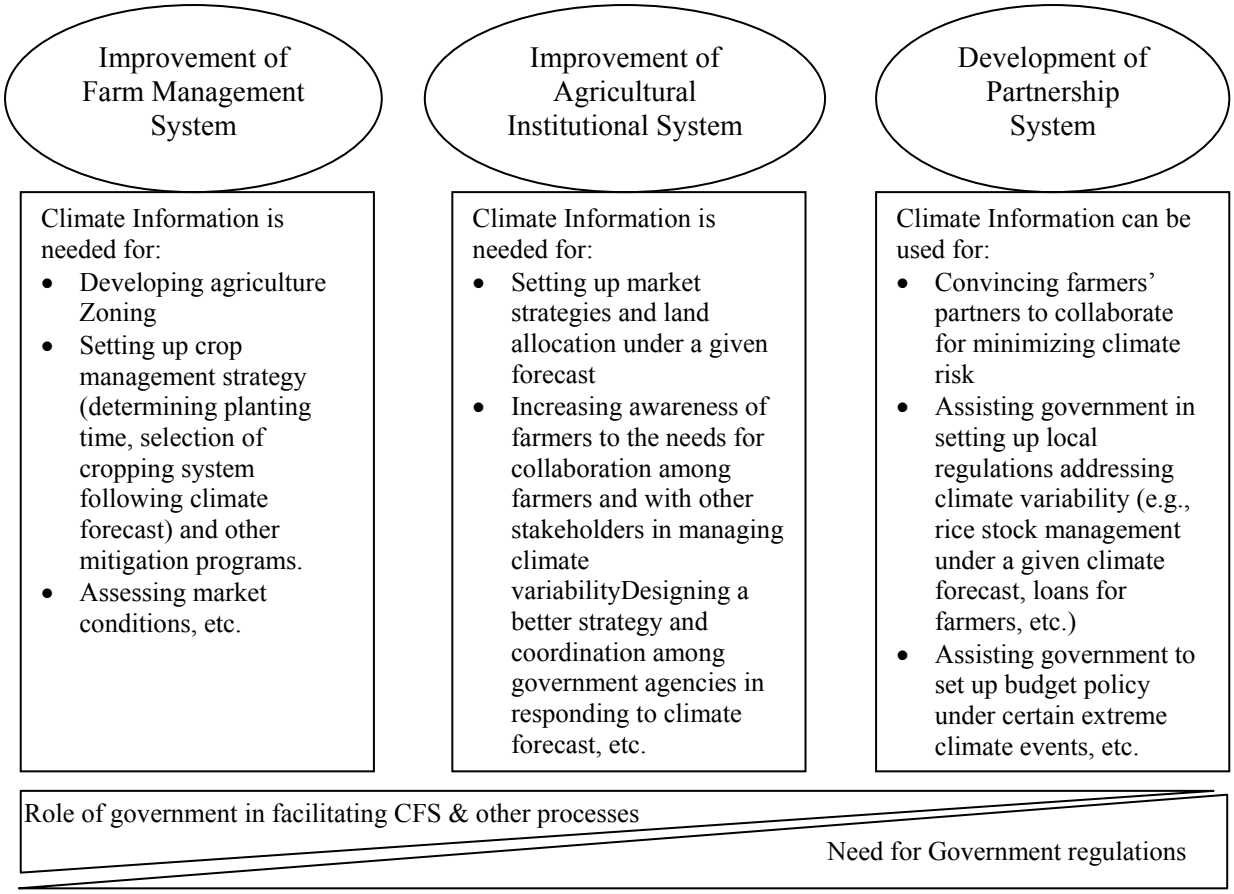

Figure 5. Climate information for agricultural development in Indramayu (Boer and Tamkani, 2003).

Conclusion

CFS might be one of the effective ways to disseminate and educate farmers on climate information application. The main challenges are the development of modules that cover climate information application for both on-farm and off-farm activities and designing programs for capacitating staff of local government agencies in climate information application. Integrated efforts among universities, research agencies, and related government agencies are required.

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