

Institutionalizing Integrated Crop Monitoring and Forecasting (ICMF) towards a Smarter Philippine Agriculture

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Abstract

Incorporating the Integrated Crop Monitoring and Forecasting (ICMF) into the Philippine agriculture is a significant step forward. Through SEAMS, under the SARAI Program, farmers gain personalized information on weather patterns and crop conditions. Proposing government support for widespread access ensures equitable dissemination of vital information. This initiative emphasizes a commitment to evidence-based decision-making, enhancing the resilience and productivity of our agricultural sector with effective scientific tools.

The SARAI-Enhanced Agricultural Monitoring System (SEAMS) is one of the systems generated by the Smarter Approaches to Reinvigorate Agriculture as an Industry (SARAI) Program supported by the Department of Science and Technology – Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development (DOST-PCAARRD). SEAMS generates for various crops Integrated Crop Monitoring and Forecasting (ICMF) bulletins which are site-specific information on weather, climate, and crop availability per locality. This information will aid farmers in determining the ideal time to plant and harvest, the kind of crops to plant, relevant approaches to managing pests and diseases, ways to optimize irrigation and post-harvest decisions.

To maximize its benefits, ICMF must be made accessible to Filipino farmers, hence the call for its institutionalization at the national and regional levels through the Department of Agriculture (DA) and in coordination with local government units (LGUs). The ICMF translates science- and evidence-based information into an easily understandable and updated format.

Need for site-specific climate outlook and weather forecast

Majority of Filipino farmers continue to cultivate crops using the same methods that their ancestors employed. Farmers use time-tested planting calendars, fertilizing amounts, pest management, and other agricultural practices. These strategies, however, have lost their effectiveness over time. Climate-related factors pose additional problems to the livelihood of already struggling Filipino farmers. Dry months have become longer, making water scarcer. The seasons have also

shifted and become hotter during the dry season and colder during the November-January months. Furthermore, rains have become more unpredictable.

Because of this, it is crucial to have cohesive, precise, and site-specific information on climate outlooks and weather forecasts. While such information is readily available on the internet and other platforms, however, forecasts that are particularly useful for agriculture are limited. Moreover, information is rarely presented in the farmers' language. Enabling access to this type of information will guide Filipino farmers in their agricultural activities.

Currently, there is a lack of cohesive, precise, and site-specific information on climate outlooks and weather forecasts that are packaged and presented specifically for agricultural use. Thus, the Integrated Crop Monitoring and Forecasting (ICMF) of the SARAI Program was developed from 2017 to 2021 to address the issue.

Housed in the University of the Philippines Los Baños (UPLB), the ICMF is composed of scientists from agriculture, computer science, statistics, physics, agrometeorology, agricultural engineering, and environmental sciences. These scientific experts produce meteorological information and crop bulletins for farmers in specific localities. The climate and cropping advisories inform farmers of the ideal time to plant, apply fertilizer, and address pest infestations, among others.

Scientists and leading experts in the climate-agricultural disciplines read and analyze meteorological information to produce site-specific cropping advisories. These may be in the form of recommended decisions and agricultural outlooks for use in crop production. Coupled with the crop experts' knowledge

stems from years of experience in agricultural research and field observation with careful consideration of the effects of weather and climate, farmers are provided with important information, such as what variety would be most ideal to plant at a given time and location.

Aside from meteorological data and crop advisories, there is a need for a fast monitoring tool to record crops and their growth stages, diseases, and planting areas affected by floods. This tool can aid in assessing incoming harvests to prepare for their storage and show the level of crop availability in the market. Monitoring can also assist in determining the areas most severely impacted by disasters, thus, increasing priority in government aid and assistance.

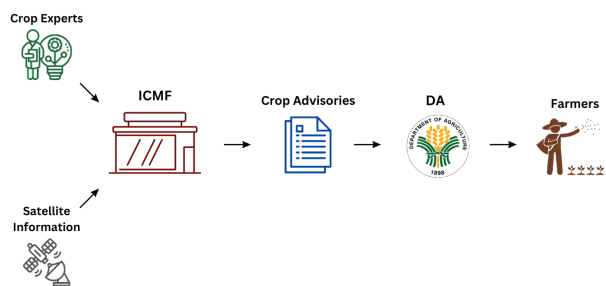
Proposed Institutionalization of ICMF

The institutionalization of the ICMF hub and the creation of new physical and virtual hubs at the national and regional levels are recommended to optimize ICMF in assisting farmers. The ICMF hub or centers are envisioned. The hubs can be housed in existing institutions such as state universities and colleges (SUCs) and are proposed to receive regular government funding and other related support, replicating the ICMF model in different regions.

ICMF agrometeorological experts make use of open-source information and the extensive network of Automatic Weather Stations (AWSs) to produce necessary climate and weather information for crop experts. This kind of information is delivered promptly through the online portal of the ICMF and in coordination with relevant agricultural technicians and LGU personnel. The portal is remotely connected to hubs at DA, SUCs, and LGUs. It is proposed to be continuously managed by the UPLB Institute of Computer Science (ICS).

The flow of information is illustrated in Figure 1. The satellite information provides 5-6 months' worth of weather forecasts, which experts analyze in conjunction with crop growth. These are turned into crop advisories submitted to the Department of Agriculture, which will process and disseminate them to farmers through the LGUs. The ICMF in the figure represents a national or regional hub to make it more accessible to the farmers.

Figure 1. General illustration of the proposed ICMF



By institutionalizing the ICMF, site-specific information on weather, climate, and crop availability will be readily available and will benefit the farmers within a unit as small as a municipality. The ICMF also features a center where agricultural technicians and other relevant staff could ask for information and recommendations to farmers in specific areas.

The ICMF's combined advisories from leading crop experts and local meteorological information will equip farmers with existing scientific knowledge, which can aid them in increasing their production and income through reduced climate risks and efficient farming decisions. Furthermore, the ICMF provides an avenue for farmers and researchers to collaborate on cropping production, thereby improving the country's agricultural status.

The center can also capacitate agricultural technicians and workers by learning more about different climate risks and how to effectively assist farmers in adapting to the changing climate.

Technology Sustainability Towards Smarter Philippine Agriculture

Through the ICMFs, farmers will have decreased risks from meteorologically related events. They will be able to face climate uncertainties without risking their planting seasons. This includes ideally scheduling the planting dates to ensure the availability of rain during the crops' critical growth stages or planting a more suitable crop that can withstand the changing weather pattern.

Provincial and municipal agriculturalists can easily access regional ICMFs to seek advice and explanations, enabling them to directly communicate the information to the farmers. It is envisioned that the regional hub will have its own capacity to collect, organize, and analyze data from the satellites and from the field validation by the local agricultural personnel. This is a preferred setup as opposed to a single hub providing all the information even to the regions. The provincial and

municipal agriculturalists are more knowledgeable about the areas, their history, and culture, and can provide information in the vernacular if needed. In here, capacity building is needed, which can be provided by the central ICMF.

At the national level, decision-makers can utilize crop monitoring products in assessing whether rice or corn importation is necessary given the forecasts of bumper yields of the crops. This would translate to local farmers not competing with imports and providing them with better prices for their crops.

Further, with ICMF in operation, there is a possibility of developing tools like mobile applications to assist not only the farmers but also the traders.

Policy recommendations / conclusions

SARAI-ICMF can provide a digital platform for agriculture in the Philippines bringing the agriculture sector immeasurable benefits. Available near real-time information provide decision makers at the national level with science-based data to analyze food availability and manage inflation. For local executives, this can be a tool for averting damage from climate risks via crop advisories, planting periods, and locations. Pest and disease detection can also be made faster and more efficient.

The use of space technology is nothing new in the fast pace of technology and information age. As this is a new milestone in agriculture, there is a need to be bolder in taking risks in investment. After all, the basis of a sound economy is a strong agricultural system, in countries like the Philippines.

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