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## ENHANCING FARMERS INFORMATION SYSTEM FOR DISASTER RISK REDUCTION AND MANAGEMENT (DRRM) IN AGRICULTURE AND FISHERIES

May 2022

SDGs:



Country: The Philippines

Project Code: TCP/PHI/3705

FAO Contribution: USD 200 000

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### Implementing Partners

Department of Agriculture (DA).

### Beneficiaries

Department of Agriculture (DA).

### Country Programming Framework (CPF) Outputs

Strategic Objective 2: Make agriculture, forestry, and fisheries more productive and sustainable. Outcome 2.4: Countries made decisions based on evidence for sustainable agriculture, fisheries and forestry while addressing climate change and environmental degradation. Output 2.4.2: Capacities of institutions are strengthened to collect, analyse, and report data for decision-making on sustainable production, climate change and environmental degradation, including relevant SDGs.

Strategic Objective 5: Increase the resilience of livelihoods to threats and crises. Outcome 5.4: Countries prepared for and managed effective responses to disasters and crises. Output 5.4.1: Capacities of national authorities and stakeholders reinforced for emergency preparedness to reduce the impact of crises.

CPF 2018-2024: Country Outcome 2 – Expanded economic opportunities in AFF and ensured ecological integrity, clean and healthy environment.

Country Outcome 3 – Reduced vulnerabilities among individuals and families and just and lasting peace achieved.



### BACKGROUND

Agriculture plays a significant role in the economy of the Philippines. The resiliency of the agriculture sector not only ensures the country's food security but also the incomes of households depending on this sector, and the sectors along its value chain. However, the country has the second highest exposure to natural hazards of any country in the world, owing to its location in the typhoon belt, through which storms generated in the western Pacific Ocean pass. Agriculture is highly vulnerable to these natural hazards, because of the sector's spatially fixed, environment-sensitive, and high-investment nature. Philippine farmers bear the brunt of the damage caused by these calamities.

In this context, the Department of Agriculture (DA) provides programmes and interventions that proactively support climate resilient agriculture (CRA), as an approach to advocate prevention, mitigation, and adaptation measures. Technologies such as satellite imagery for near real-time monitoring, and remote sensing and geographic information system, and other information and communications technology (ICT) make it possible to provide farmers with timely, location-specific, and accurate information for their farms.

However, intensive collection of farming field data has not yet been established in the country. Usually gathered through projects and the national census, field-level data are static, unsustainable and widely spaced in time. The data may or may not contain a complete list of farmers and data fields, and do not provide mechanisms for monthly updating and validation of data, which are much needed for disaster risk reduction and management (DRRM) early action, response and rehabilitation. Against this background, the project aimed to improve the capacities of the agriculture sector on data collection and information management, in order to enable timely, critical, and efficient decision-making and delivery of interventions, to improve the management of crops and farm lots.

### IMPACT

The project interventions significantly enhanced the DA's farmers information system and geo-referencing of farm lots, thereby ensuring more timely and accurate reporting of crop data and the impact of disasters. It is expected that this will contribute to improving agricultural management, productivity and agriculture-based livelihoods, as well as to achieving SDGs 2 (Zero Hunger) and 13 (Climate Action).

### ACHIEVEMENT OF RESULTS

The project improved the capacities of the country's agriculture sector in undertaking data collection and information management, by: i) developing methods/tools to collect farmers' profiles, and provide production support and DRRM information at the field level; ii) introducing methodologies and tools to improve the accuracy and efficiency of data collection at the field level; and iii) enhancing the farmers information system through the establishment of the iFarm system. This will ensure that proper real-time data will be available to decision-makers, thereby enabling them to make better decisions and policies. In addition, capacity building was provided for the DA personnel (central and regional offices) and agricultural extension workers of local government units (LGUs), to enable them to use the iFarm system.



To begin with, a survey of existing registry systems was conducted. The survey showed that it was necessary to streamline the various information systems, and to ensure that the databases of the various systems were harmonized.

The iFarm system was developed to provide a database containing detailed farmers and field data (e.g. area cultivated, planting and harvesting dates, damage due to natural hazards, response/rehabilitation interventions). The system enables data collectors to collect farmer data efficiently. In addition, it has a database system that allows the integration of various systems into it, to allow the proper harmonization and sharing of data, which can be used by the DA for timely, critical and efficient decision-making. Several testing and validation processes were undertaken to ensure that the system would be useful for target users. In addition, the Financial Planning and Analysis Units (FPAUs) used a test script to test the system and determine the needed enhancements. A bug/enhancement tracker was also added, to properly document the validated findings of the testers.

A total of 2 511 farmers was registered in the farmers' and geo-referenced farm lot information system; and 2 625 farm lots were registered with geo-referenced information, exceeding the envisaged target. The data were archived in the iFarm system. This will improve the DA's capacity to provide information and advice derived from agrometeorological observations to farmers, as part of its DRRM strategies.

Based on data collection guidelines, a computer-aided data entry and collection system, which will have both web-based and offline versions, was developed to facilitate ease of data entry, and improve data quality. However, not all the data were collected and submitted via the iFarm system, as the system was not completed until after the data collection had been conducted. The information system will be tested by populating it with the geo-referenced data collected during the pilot runs of the systems developed during the project.

In addition to the development of the registration system and the information system, the LGUs and Regional Field Offices (RFOs) at the pilot sites were capacitated to collect data, geo-reference farm lots, and perform basic soil analysis. Two manuals were also developed, namely iFarm Developer's Manual and iFarm User's Manual, to maintain, troubleshoot, update and sustainably manage the information system. These manuals can also help end users update farmers' information in the system.

Capacity building with the DA offices was undertaken after the final version of a fully functioning system was deployed. This included major enhancements in its features, such as system integration processes with existing systems; restructured databases; robust administrative management; version history; security enhancements; and optimized codes.

In addition to DA Central Office personnel, training participants from regional, provincial, and municipal agriculture offices were provided with hands-on-training in the use of the iFarm system and its updating and maintenance, using their own individual accounts with customized roles and permission aligned with the defined workflows by the DA central office. The participants demonstrated proficiency in the use of data collection features and gave higher usability scores to the application. They also suggested further enhancements, which were developed and deployed in the final version that was handed over to the DA Central Office.

Finally, field data collection and monitoring of rice and corn crops by Municipal Agriculture Office personnel (agricultural extension workers) and project field assistants were supervised by DA Central Office personnel, DA Regional Field Office personnel, and FAO. Field data collected included farmers' information, location and area of the farm lot (geo-referencing), planting and harvesting, and damage and losses interventions received by the farmers (in the case of the occurrence of natural hazards, such as typhoon, flooding, drought).

## IMPLEMENTATION OF WORK PLAN AND BUDGET

Some of the project activities were delayed, owing to: i) the COVID-19 pandemic situation; and ii) delays in the signing of the project agreement by the DA, due to lengthy government clearance procedures. However, the outputs were met.

Given these delays and challenges, two no-cost extensions were requested and approved. All activities were implemented within the project budget.

## FOLLOW-UP FOR GOVERNMENT ATTENTION

In terms of data collection, and the piloting of the tool, the project outcome was achieved. However, it is strongly advised that the DA scale up the system at the national level.

It is also highly recommended that the iFarm system be properly maintained, and that bugs be addressed immediately. In addition, the system should have a road map, to ensure that fixes and features can be added promptly.

## SUSTAINABILITY

### 1. Capacity development

With regard to the relevant policies and legal framework in place or under development that support the sustainability of the project outcome, there should be a clear policy on data sharing and data use, to ensure that the iFarm system is useful for data collection and data analytics. In terms of institutional support, it is strongly advised that dedicated personnel be assigned to the support and maintenance of the system.

In terms of the project being embedded in organizational structures that are likely to survive beyond the project and are committed to sustainability of results, DA Field Programs Operational Planning Division (FPOPD) has provided strong support and has demonstrated that they will support the system after the project.

With regard to partnerships and alliances being created or strengthened that will contribute to the project's sustainability, strong partnerships with the LGUs were developed. However, no legal agreement was signed to formalize these partnerships.

Finally, service providers were hired to support the follow-up of the enhancement/implementation of the system. A sustainability plan will be submitted by these service providers.

### 2. Gender equality

This cross-cutting area was not applicable to the project.

### 3. Environmental sustainability

The project supported environmental sustainability, as the iFarm system has been developed to improve the capacity of the DA in DRRM in agriculture and fisheries.

### 4. Human Rights-based Approach (HRBA) – in particular Right to Food and Decent Work

This cross-cutting area was not applicable to the project.

### 5. Technological sustainability

Open-source technologies were used, thus ensuring flexibility in the further development of the project activities.

Capacity building was done with the LGUs, to ensure that they were able to use the system.

In terms of the capacity of stakeholders and beneficiaries to pursue the project activities without further technical assistance, based on the feedback of stakeholders, they have the capacity to use the system beyond the project.

### 6. Economic sustainability

The DA will procure dedicated servers, which can be used to support the system.

Apart from the geo-referencing tools, the other products are free of charge.



## DOCUMENTS AND OUTREACH PRODUCTS

- ❑ **FAO.** Completed 5 January 2022 (forthcoming). *iFarm Developer's Manual*. 13 pp.
- ❑ **FAO.** Completed 10 January 2022 (forthcoming). *iFarm User's Manual*. 15 pp.



## ACHIEVEMENT OF RESULTS - LOGICAL FRAMEWORK

<b>Expected Impact</b>	<b>Improved agricultural management, productivity and agriculture-based livelihoods through enhancing DA's farmers information system and geo-referencing of farm lots</b>		
<b>Outcome</b>	Readily, timely and reliable available information of farmers, farm lots area and, location-specific interventions provided to be used for sound policy formulation and planning of the DA		
	<b>Indicators</b>	<ul style="list-style-type: none"> <li>– Number of farmers registered in the Farmers' and Geo-Referenced Farm Lot Information System.</li> <li>– Number and area of farm lots registered with geo-referenced information.</li> </ul>	
	<b>Baseline</b>	<ul style="list-style-type: none"> <li>– 0 number of farmers initially registered.</li> <li>– 0 number of fields and 0 hectares of rice and corn farms initially geo-referenced.</li> </ul>	
	<b>End Targets</b>	<ul style="list-style-type: none"> <li>– 2 500 number of farmers registered after the project.</li> <li>– 2 000 hectares area of rice and corn farms geo-referenced after the project.</li> </ul>	
	<b>Comments and follow-up action to be taken</b>	<p>The project improved the capacities of the country's agriculture sector in undertaking data collection and information management. This was achieved by developing: i) a protocol to identify and map out farm plots; ii) introducing methodologies and tools to improve the accuracy and efficiency of data collection at the field level; and iii) establishing an information system (the iFarm system), which enables farmer data to be collected efficiently, and can be used by the DA to ensure that integrated and timely data is available for decision-making. In addition, capacity building was provided for DA and LGU personnel, to enable them to use the system.</p> <p>It is strongly advised that the iFarm system be properly maintained, and that bugs be addressed immediately. The system should also have a road map, to ensure that fixes and features can be added promptly.</p>	
<b>Output 1</b>	Data collection methods and tools for farmer profile, production support and DRRM information at the field level		
	<b>Indicators</b>	<b>Target</b>	<b>Achieved</b>
	Existence of methods/tools to collect farmer profile, production support and DRRM information in the field.	1 integrated system.	Yes
<b>Baseline</b>	There are systems that can be used to collect farm and farmer-related data; however, these information systems are not integrated and do not have harmonized databases.		
<b>Comments</b>	The iFarm system was developed. It will integrate the necessary systems and will ensure that the databases are harmonized. This will ensure that proper real-time data will be available to decision-makers, thereby enabling them to make better decisions and policies.		
<b>Activity 1.1</b>	Desk survey of existing registry systems and field data collection methods and tools		
	<b>Achieved</b>	Yes	
<b>Activity 1.2</b>	Consultation Workshops on the development of the Farmers' and Geo-Referenced Farm Lot Information System		
	<b>Achieved</b>	Yes	
<b>Activity 1.2</b>	<b>Comments</b>	<p>A series of consultations was carried out in different modes, including: i) workshops (for training Municipal Agriculture Office [MAO] and other LGU personnel); ii) consultation meetings; iii) regular meetings with DA personnel; and iv) regular meetings with project field assistants.</p> <p>During all these meetings, issues faced by encoders on the ground were discussed, to ensure that the data collection was conducted properly. In addition, the importance of having a single source of data for the data dashboards was discussed.</p>	

Activity 1.3	Develop data collection method		
	Achieved	Yes	
	Comments	The iFarm system (web-based portal) was developed to provide a database containing detailed farmers and field data (e.g. area cultivated, planting and harvesting dates, damage due to natural hazards, response/rehabilitation interventions). The system enables data collectors to collect farmer data efficiently. In addition, it has a database system that allows the integration of various systems (i.e. RSBSA database, RCM) into it, to allow the proper harmonization and sharing of data, which can be used by the DA for timely, critical and efficient decision-making.	
Activity 1.4	Test and validate data collection method		
	Achieved	Yes	
	Comments	Several testing and validation processes were undertaken, to ensure that the system would be useful for target users. Using the data collection methods developed, the questionnaire surveys were pre-tested (using responses from DA and LGU personnel), and then tested using a limited number of farmer respondents and farm lots. The FPAUs used a test script to test the system and determine the required enhancements (i.e. data standards, additional data filters, data structure). A bug/enhancement tracker was also added, to properly document the validated findings of the testers.	
Output 2	Farmers' and Geo-Referenced Farm Lot Information System		
	Indicators	Target	Achieved
	<ul style="list-style-type: none"> <li>– Number of farmers registered in the Farmers' and Geo-Referenced Farm Lot Information System.</li> <li>– Number and area of farm lots registered with geo-referenced information.</li> </ul>	<ul style="list-style-type: none"> <li>– 2 500 farmers registered.</li> <li>– 2 000 hectares area of rice and corn farms geo-referenced after the project.</li> </ul>	Yes
Baseline	There is no digital data containing the needed data.		
Comments	The total number of farmers registered in the Farmers' and Geo-Referenced Farm Lot Information System was 2 511; and the total area of farm lots registered with geo-referenced information was 2 625, thereby exceeding the envisaged target.		
Activity 2.1	Development of the system front-end (data entry and collection software)		
	Achieved	Yes	
	Comments	Based on data collection guidelines, a computer-aided data entry and collection system, which will have both web-based and offline versions, was developed to facilitate ease of data entry, and improve data quality. iFarm's front-end user interface was developed, using Laravel and Bootstrap.	
Activity 2.2	Development of the system back-end and database structure		
	Achieved	Yes	
	Comments	The system was developed by utilizing all the data fields that were created through the data collection guidelines and select data fields from the existing RSBSA and RCM databases. Based on agreed data sharing mechanisms between the FPOPD and other divisions/agencies maintaining these information systems, certain fields were linked and made relational. Varying levels of access will be given to different DA units. The data were standardized, as agreed with the DA, RFOs and LGUs, through consultation workshops and meetings. The development of the system back-end was carried out, using Laravel and MySQL.	
Activity 2.3	Develop protocols to maintain, troubleshoot, update, and sustainably manage the information system		
	Achieved	Yes	
	Comments	A developer's manual (iFarm Developer's Manual) and user's manual (iFarm User's Manual) were developed to maintain, troubleshoot, update, and sustainably manage the information system. These manuals can also help end users update farmers' information in the system.	
Activity 2.4	Pilot test using data collected from pilot runs of outputs 1 and 2		
	Achieved	Partially	
	Comments	Not all data was collected and submitted via iFarm, as the system was not completed until after the data collection had been conducted. The information system will be tested by populating it with the geo-referenced data collected during the pilot runs of the systems developed under Outputs 1 and 2.	

<b>Output 3</b>	Capacity building for DA regional field offices and municipal agriculture workers to utilize and maintain the information system		
	Indicators	Target	Achieved
	Number of operating units capacitated in information system utilization and maintenance.	1 RFO, 1 PLGU, 2 MLGUs capacitated in information system utilization and maintenance after the development of the system.	Yes
<b>Baseline</b>	Initial usability score from user experience interviews: 63.70.		
<b>Comments</b>	Capacity building with the DA offices was done after the final version of a fully functioning system was deployed. This included major enhancements in its features, such as system integration processes with existing systems (RSBSA, RCM); restructured databases; robust administrative management; version history; security enhancements; and optimized codes. In addition to DA Central Office personnel, DA RFO personnel (9), Provincial Local Government Unit (PLGU) – Provincial Agriculture Office of Tarlac personnel (3), and Municipal Local Government Units (MLGUs) – Municipal Agriculture Office personnel from Concepcion and La Paz, Tarlac Province (16) were capacitated in the use of the iFarm system and its updating and maintenance.		
<b>Activity 3.1</b>	Capacity building on the use of the platforms for farmer and farm lot registration, geo-referencing		
	Achieved	Yes	
	Comments	Training participants from regional, provincial, and municipal agriculture offices were provided with hands-on-training, using their own individual accounts, with customized roles and permission aligned with the defined workflows by the DA Central Office. The participants demonstrated proficiency in the use of data collection features and gave higher usability scores to the application: from 64 to 82% (an 18% increase in quality from the initial version). They also suggested further enhancements, which were developed and deployed in the final version that was handed over to the DA Central Office.	
<b>Activity 3.2</b>	Capacity building on the management and maintenance of the Farmers' and 3 Geo-Referenced Farm Lot Information System		
	Achieved	Yes	
	Comments	A user experience research and technical assessment report was provided to the DA central office. The reports presented to the DA central office disaster risk reduction (DRR) and IT unit outlined the different aspects to consider in the management and maintenance of the system. A shared data review was also conducted as part of the capacity building, where a finalized data dictionary and data standards were produced. The DA team managing the application is highly proficient in how to manage and maintain the information system.	
<b>Activity 3.3</b>	Updating of remotely sensed data from satellite and UAS for the geo-referenced farm lots		
	Achieved	Yes	
	Comments	The technicians were provided with a tutorial on how to generate shapefiles that contained the vector/geospatial data of the farm lots with the attached excel data containing the necessary information regarding the map being discussed (flooding, Normalized Difference Vegetation Index [NDVI], etc.). The excel file and the vector/geospatial data can be merged and uploaded using the tool provided. An Unmanned Aerial System (UAS) or drone was also used to validate the status of crops in the geo-referenced farm lots in the pilot sites.	
<b>Activity 3.4</b>	Supervised fieldwork on data collection and monitoring of planting and harvesting, damages and losses and interventions/assistance received		
	Achieved	Yes	
	Comments	Field data collection and monitoring of rice and corn crops by Municipal Agriculture Office personnel (agricultural extension workers) and project field assistants were supervised by DA Central Office personnel, DA Regional Field Office personnel, and FAO. Field data collected included farmers' information, location and area of the farm lot (geo-referencing), planting and harvesting, and damage and losses interventions received by the farmers (in the case of the occurrence of natural hazards such as typhoon, flooding, drought).	

**Partnerships and Outreach**

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