Report of Committee on the Management of Cropland Information Utilizing “Digital Map”

March 17, 2020

Committee on the Management of Cropland Information Utilizing “Digital Map”

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Chapter 1 Introduction

The policies to promote agriculture and revitalize rural areas set forth by the Ministry of Agriculture, Forestry and Fisheries (MAFF) are implemented based on the information on cropland. Currently, though, cropland information is individually collected and managed by the implementing bodies of each policy. This has led to a situation where:

- farmers are required to separately notify similar information to different implementing bodies;
- each implementing body manages cropland information using its own database; and,
- each implementing body performs on-site verification, resulting in a huge operational burden for matching the information on different databases to maintain its consistency, and in some cases, information is inconsistent.

Cropland information forms the very foundation of promotion of agricultural policies, and maintaining its accuracy and consistency is critically important. However, the aging and declining number of staff at implementing bodies has brought about the situation of increasing difficulty to secure personnel for performing tasks concerning cropland information, such as collection, on-site verification, and matching.

Meanwhile, a technological environment that enables centralized management of cropland information is being established, including:

- the rapid development of map information digitalizing technologies utilizing satellite images, etc.;
- the full operation of the “MAFF Common Application Service (eMAFF)” planned to start in FY2021; and,
- the Fude Polygon (cropland lot data in which Japan’s land is divided into 30 million lots (*fudes*)) made available in 2019.

Taking into account such circumstances, in a bid to reduce the burden on farmers and relevant parties such as implementing bodies while ensuring the accuracy and consistency of cropland information, MAFF established an expert committee to deliberate on a method to centrally manage cropland information and how to utilize it effectively. This report summarizes the results of deliberations at the committee.

Chapter 2 Current Situation and Problems

2.1 Cropland information used in administrative procedure at MAFF

Currently, cropland information is individually managed by the implementing bodies of each policy, and paper is used for application. This requires a substantial amount of labor in inputting and managing application information and linking application information to map information. The subsections below discuss the current situation and problems concerning cropland information in procedures related to the transfer of cropland rights, business income stabilization measures, and agricultural insurance.

2.1.1 Procedures related to transfer of cropland rights

- Aim of the system

With the main mission being “promotion of optimization of use of cropland, etc. (integration and consolidation of cropland use on farmers, prevention and minimization of unused cropland, promotion of new entries),” agricultural committees are established at municipalities as an administrative committee for executing administrative operations related to cropland, such as permission of sale and lease of cropland in accordance with the Cropland Act, determination of agricultural land use integration plan in accordance with the Act on Promotion of Improvement of Agricultural Management Foundation, and offering opinions about diversion of cropland.

The mandatory operations of agricultural committees are matters authorized by the Cropland Act, etc. (permission of sale and lease of cropland, offering opinions about diversion of cropland, measures about unused cropland) and promotion of optimization of use of cropland, etc., and the optional operations are rationalization of agricultural business (e.g., incorporation) and collection and provision of information on agriculture in general.

- Application items for when transferring cropland rights

For example, when a farmer desires to set or transfer rights of sale or lease about an area of cropland, the farmer is required to obtain a permission from an agricultural committee in accordance with Article 3 of the Cropland Act. To apply for the permission, the farmer must submit about 10 sheets of application documents providing information shown below. After receiving the documents, an agricultural committee needs to enter and manage what’s written in the application, review at an agricultural committee meeting, issue a notice of permission to the farmer if the application was successful, and reflect the information in cropland ledgers.

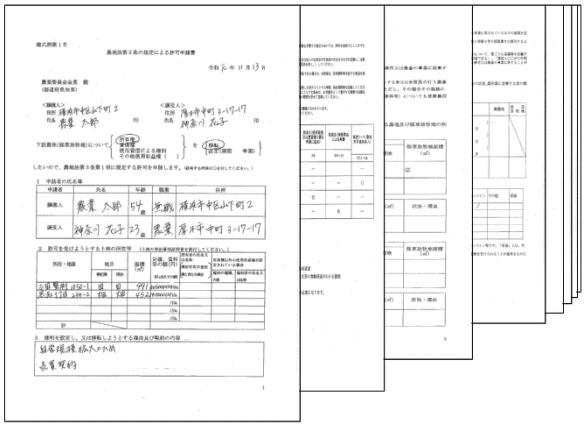

Figure 1: Written application for permission under Article 3 of Cropland Act (example)

Figure 2: A file of written applications submitted in a year under Article 3 (Sale) of Cropland Act

- ✓ Information on the person to set rights (name, address, name of representative for a juridical person), the right to acquire (e.g., ownership)
- ✓ Information on the land to acquire (e.g., location, lot number, land category, land area)
- ✓ [1] state of use of already owned cropland, etc., [2] situation of ownership, and [3] planned purchase of machinery (e.g., tractors) necessary for cultivation, and, situation of persons engaged in farm work (e.g., name, number of days to engage in farm work per year), concerning the person intending to acquire rights
- ✓ Situation of members (for a juridical person)
- ✓ Relation with surrounding areas (impact on agricultural use), etc.

• <u>Survey items in cropland usage surveys</u>

A usage survey (on-site survey of usage for all cropland) is performed once a year to check whether the owners, etc., are fulfilling their duties to properly and efficiently use cropland. Information required in the usage surveys is as follows:

Figure 3: Usage survey

- ✓ Location of cropland (lot number, land category, area, etc.);
- ✓ Judgment of unused cropland, owner information (name, name of representative for a juridical person, address, etc.);
- ✓ Information of the person to set rights (name, name of representative for a juridical person, address, etc.), etc.

- Problems

The number of cases requiring legislative operations and the workload of inputting and managing cropland information on cropland ledgers under the Cropland Act and Act on Promotion of Improvement of Agricultural Management Foundation is increasing. The aging farming population indicates that the workload will continue to increase in the future as the integration and consolidation of cropland advance.

Figure 4: Promotion council members putting actual situation down on maps

These operations have some problems. Agricultural committees currently use two systems: a municipality's own cropland ledgers system and the Agricultural Land Information System Agricultural Committee (ALIS-AC) promoted by the national government.

ALIS-AC[1] is a nationwide centralized cloud system established for digitizing, mapping and publishing cropland information based on cropland ledgers prepared by agricultural committees, etc., at municipalities, to be used as reference information by new entrants and for intermediary institutions that manage cropland to integrate and consolidate cropland. However, municipalities are still using their own cropland ledgers systems they have grown accustomed to. As a result, information on ALIS-AC remains un-updated, and some agricultural committees are required to enter information for both systems. In addition, no framework specialized in a cloud system needed for inputting relevant information has been built, and delays are seen in inputting information on cropland ledgers, etc.

When it comes to the utilization of ALIS-AC in on-site surveys, extra workload is placed on staff, for example, to rearrange map information after returning to the office from sites because some map information in ALIS-AC is not up to date due to the reasons mentioned above and information cannot be edited on site using a tablet, etc.

[1] Agricultural Land Information System Agricultural Committee: a nationwide centralized cloud system for digitizing, mapping and publishing cropland information based on cropland ledgers prepared by agricultural committees, etc., at municipalities, to be used as reference information by new entrants and for intermediary institutions that manage cropland to integrate and consolidate cropland.

- Example workload of information inputting work

As a specific example, the Agricultural Committee of Atsugi City, Kanagawa Prefecture receives all application documents related to transfer of cropland rights in writing, and the thickness of the file of application documents submitted in a year under Article 3 (Sale) of the Cropland Act becomes approximately 17 cm. The thickness becomes twice as much (34 cm) for the documents on lease of cropland, and thrice as much (51 cm) for documents on diversion of cropland. Such a number of written documents incurs a substantial cost in reviews and storage, and on-site surveys performed by secretariat staff related to various verification and reviewing operations are taking approximately 600 hours a year. Further, preparing a map takes about 40 hours, cropland usage survey (legally required survey) approximately 45 man-days, and cropland patrolling performed by promotion council members (Atsugi City's own survey) approximately 120 man-days. On top of that, post-processing to input the results of on-site surveys into ALIS-AC takes approximately 10 hours.

Figure 5: A file of documents related to on-site surveys performed in a year

51-cm thick	documents on diversion of cropland (a year)
600 hours	for on-site surveys for verification and reviewing operations (a year)
120 man-days	for cropland patrol performed by promotion council members (a year)

(Atsugi City Agricultural Committee)

2.1.2 Procedures related to business income stabilization measures

- Aim of the system

The business income stabilization measures are a system for the Japanese government to directly pay applicants direct payment grants on crops (*geta* measure: a measure to raise the standard of income), grants to mitigate the impact of reduced income from rice and crops (*narashi* measure: a measure to reduce fluctuations in income) and direct payment grants on utilization of rice paddy fields, to contribute to stable and sustained business of farmers. In implementing the business income stabilization measures, each region establishes a Regional Council for the Regeneration of Agriculture comprising of local municipalities, agricultural cooperatives, agricultural insurance associations, agricultural committee, farmers, etc., and the council performs: distribution, collection, and data input of farming programs, grant application forms, etc.; verification of acreage of target crops; and activities to disseminate and promote the measures.

- Items required for application

A farming program form to enter cropland information necessary for an application for a grant has approximately 16 fields to fill in. In the case of an applicant who has 100 cropland lots, the data volume will be approximately 1,600 fields. Information on cropland to be entered in a farming program includes the lot name, lot number, area (total area, crop acreage), cropping season, crops, variety, land owner, farmer, purpose of cropping (for sale or self-consumption), and grant category.

Since the cropping system and farming pattern vary by region, production region grants[2] with varying aid content by region are given. Because of that, the cropland information collected to run the grant system varies by Regional Council for the Regeneration of Agriculture, and the format of farming program, etc., also varies by region. A Regional Council for the Regeneration of Agriculture prints the previous fiscal year's information on a farming program and distributes it, and the applicant must manually make corrections for any changes from the previous fiscal year and submit the corrected farming program. In the case of a new application, a farmer needs to fill out all fields for all the cropland lots the farmer has. For these manually corrected application documents, a Regional Council for the Regeneration of Agriculture collects them and manually inputs information on the applicant, area, etc., into a system. Management and storage of these application documents are also burdensome.

[2] A grant to support activities such as [1] initiative to improve the productivity of wheat, soybeans, etc., on rice paddies and [2] initiative to produce regional promotion crops and stockpile rice implemented according to a Paddy Full-utilization Vision prepared by the region.

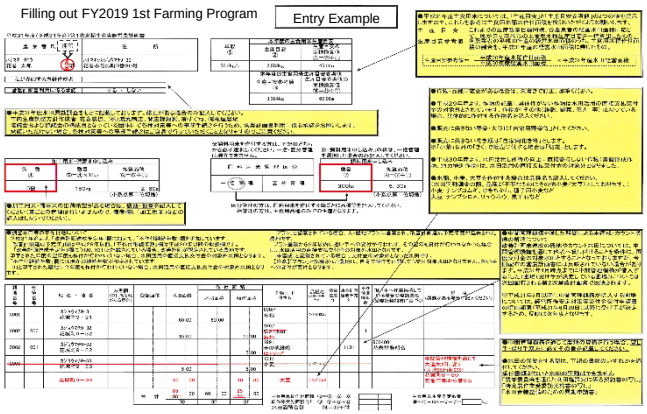

Figure 6: Example farming program (1st)
(In the case of Hanamaki City, applications are to be made multiple times at the paddy change survey, and 1st, 2nd and 3rd farming program applications.)

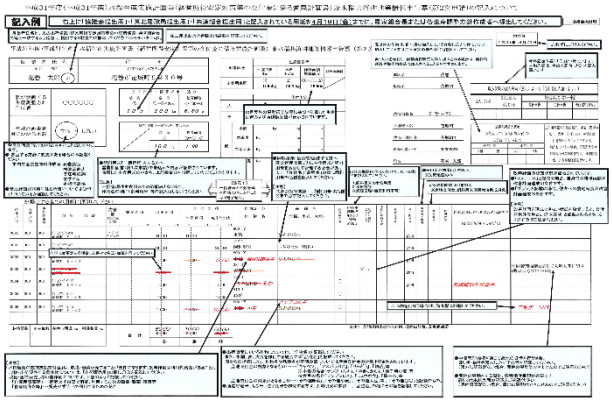

Figure 7: Example farming program (2nd)

- On-site verification

To confirm cropping and farming management are performed as shown in the application, a Regional Council for the Regeneration of Agriculture verifies the state of cultivated land through on-site verification and records the results on a field notebook, etc. The information on cropland recorded in a field notebook for on-site verification includes lot name, lot number, area (total area, crop acreage), cropping season, crops, variety, state of production (good, acceptable, unacceptable, etc.), and photographs of the current state. The cropland information to verify varies by Regional Council for the Regeneration of Agriculture, and the items to verify also vary by Regional Council. If a photocopy of the farming program is used in on-site verification, in some cases, verification results are directly written into a map for on-site verification. The number of on-site verifications performed varies depending on the farming scale of the region, but one municipality usually performs on-site verification for thousands to tens of thousands of lots. Where necessary, on-site verification is performed multiple times a year for the same cropland, depending on the farming season (e.g., sowing, harvesting). When as a result of on-site verification there was a discrepancy from the information provided in the application documents, the Regional Council for the Regeneration of Agriculture confirms it with the farmer and corrects the data on the system.

Figure 8: On-site verification

- Problems

Several concerns were raised over these operations. In some regions, application documents are consolidated for agricultural insurance, farming program, etc., through carbon copies. However, even in such a case, data sharing with an agricultural insurance association is performed manually (e.g., through emails), which is causing a huge burden on the operations to share information with the agricultural insurance database. In some other cases where application documents are consolidated, both the Regional Council for the Regeneration of Agriculture and the agricultural insurance association manually input information on handwritten application documents, resulting in unnecessary redundant operations.

- Example workload required for operations

As a specific example, this subsection talks about the case of the Agriculture Promotion Council (Regional Council for the Regeneration of Agriculture) of Hanamaki City, Iwate Prefecture. Paddy ledgers organizing work and application acceptance work performed by the council staff call for processing 57,300 sheets of paper over the total processing time of 2,136 hours in a short period of time, every year. Hanamaki City has introduced a map system for on-site surveys, and special processing (e.g., data processing) for building the base of the map system for 118,838 land lots requires approximately 48 hours each time.

Figure 9: A cabinet holding files of farming programs for one year

As another example, at Shiroishi Town in Saga Prefecture, on-site surveys are performed for approximately 23,000 land lots, and on-site verifications are performed 2-3 times a year for the same cropland at various farming seasons (e.g., sowing, harvesting, crop rotation).

2,136 hours	for reception of applications for income stabilization measures, etc. (a year) [1]
57,300 sheets	for reception of applications for income stabilization measures, etc. (a year) [1]
23,000 lots	undergo on-site verifications, 2-3 times a year [2]

([1] Hanamaki City Agriculture Promotion Council. [2] Shiroishi, Saga)

2.1.3 Procedures related to agricultural insurance

- Aim of the system

The agricultural insurance system is to compensate losses such as a reduction in the yield due to a natural disaster based on the Agricultural Insurance Act, for the purpose of stabilizing the business of farmers. It covers losses made by farmers using a system of insurance, in which farmers pay premiums in advance to build a pool of reserved funds and mutual aid money is paid from the pool when damage occurs.

- Items required for application

The flow of office work for becoming a member of agricultural insurance is divided into two cases, one being a case where the participation application form is consolidated with the farming program, etc., for the business income stabilization measures by copying, and the other being a case where the application form is not consolidated. The consolidated case accounts for 3/4 of all cases, and the un-consolidated case 1/4.

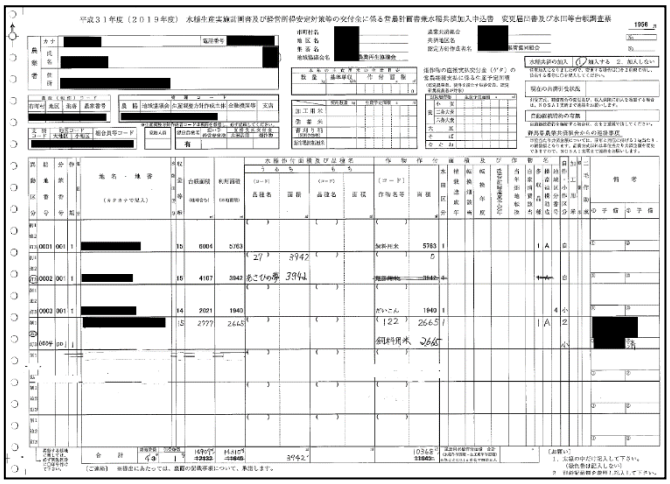

Figure 10: A consolidated form (example)

In the case where the form is consolidated, in most regions, the Regional Council for the Regeneration of Agriculture distributes the participation application form, etc., to farmers and collects it from them via JA staff, regional officer, etc. Once collected, the Regional Council for the Regeneration of Agriculture and JA input data for the information like below provided on the participation application form, etc., to share the data with the insurance association. In some cases, the insurance association inputs data and provides the Regional Council for the Regeneration of Agriculture with the data.

An application form is distributed with the previous fiscal year's information printed on it. If there is a change from the previous year's information, the applicant is required to manually make corrections and submit it. This is causing a lot of work through making corrections as many farmers have several dozens of land lots nowadays.

In the case where the form has not been consolidated, an insurance association distributes the participation application form to farmers and collects it from them via insurance contact persons of the region (representative farmers of the region; approximately 130,000 persons in Japan). The insurance association then matches the provided information with the data of the Regional Council for the Regeneration of Agriculture. This matching work has been carried out for years as part of confirmation of change of crops.

- ✓ Cropland name and lot number
- ✓ Cropland area (actual land area)
- ✓ Accepted area (crop acreage)
- ✓ Variety
- ✓ Special cultivation circumstances (e.g., organic farming), etc.

- On-site verification

When damage has occurred that may necessitate payment of mutual aid money, a farmer submits a damage assessment field notebook to an insurance association in the harvesting season to notify the damage. At the same time, the farmer erects an on-site assessment signboard so that damage assessors can recognize the damaged ploughland.

Figure 11: On-site assessment signboard

The insurance association that received the notification of damage specifies the sections to assess damage, forms an assessment team, and arranges maps as preparation for damage assessment through on-site verification. Then, in the harvesting season, agricultural insurance association staff and damage assessing farmers carry out on-site verification. In 2018, on-site verification was performed for 40,000 farmers that sustained damage (the number of damage assessors for crop insurance was 120,000). Persons in charge of assessment write down the damage assessment result in a damage assessment field notebook, and then association staff input the information into an agricultural insurance business processing system.

Figure 12: On-site survey

Figure 13: A paper map marked with a highlighter pen
Reference: Kankosha Digital Meisize Cadaster Edition

- Problems

There are problems in these operations. In regions where the application documents are not consolidated with those for the business income stabilization measures, an applicant needs to prepare application documents for both systems, and an insurance association is required to inject resources into distribution and collection of participation application forms and match data with the Regional Council for the Regeneration of Agriculture. Meanwhile, even in regions where the application documents have been consolidated with those for the business income stabilization measures, if data are supplied from the Regional Council for the Regeneration of Agriculture, in many cases, the format of agricultural insurance needs to be modified (e.g., deletion of unnecessary items) to take the data into the system of the insurance association.

In addition, even in the case where the application documents have been consolidated, in some regions, the Regional Council for the Regeneration of Agriculture and the agricultural insurance association redundantly perform inputting information provided in handwritten application documents. Further, when a need to correct data arises, the information is shared between the insurance association and the Regional Council for the Regeneration of Agriculture every time, but sometimes the person in charge fails to share information and the application is processed using old data.

- Example workload required for operations

Figure 14: Data inputting work

As a specific example, at the Gunma Prefecture Agricultural Insurance Association (NOSAI Gunma), the work to input data on participation application forms is carried out along with the cropland information management operation at the Regional Council for the Regeneration of Agriculture, and the cropland information management operation at Gunma Prefecture is taking 200 man-days for approximately 71,000 lots across the Regional Council for the Regeneration of Agriculture. In addition, the insurance association retains the consolidated form in the format of PDF or photocopies, and each branch stores data for 22,000 lots for approximately 7,200 entities. Further, NOSAI Gunma performs on-site surveys for 40,000 ploughland lots for which damage has been reported (in 2010), though it varies depending on the degree and type of damage.

The compensation program to pay mutual aid money depending on the state of damage per cropland (single lot method) is to be discontinued after 2021. Accordingly, how to handle cropland information needs to be deliberated in future studies about an ideal insurance system. It is worthy of note that management of cropland information is not required for farmers who have switched to

income insurance.

200 man-days	for cropland management operation for approx. 71,000 lots
7,200 entities	data for 22,000 lots to be individually converted to PDF or input (Gunma Prefecture Agricultural Insurance Association)

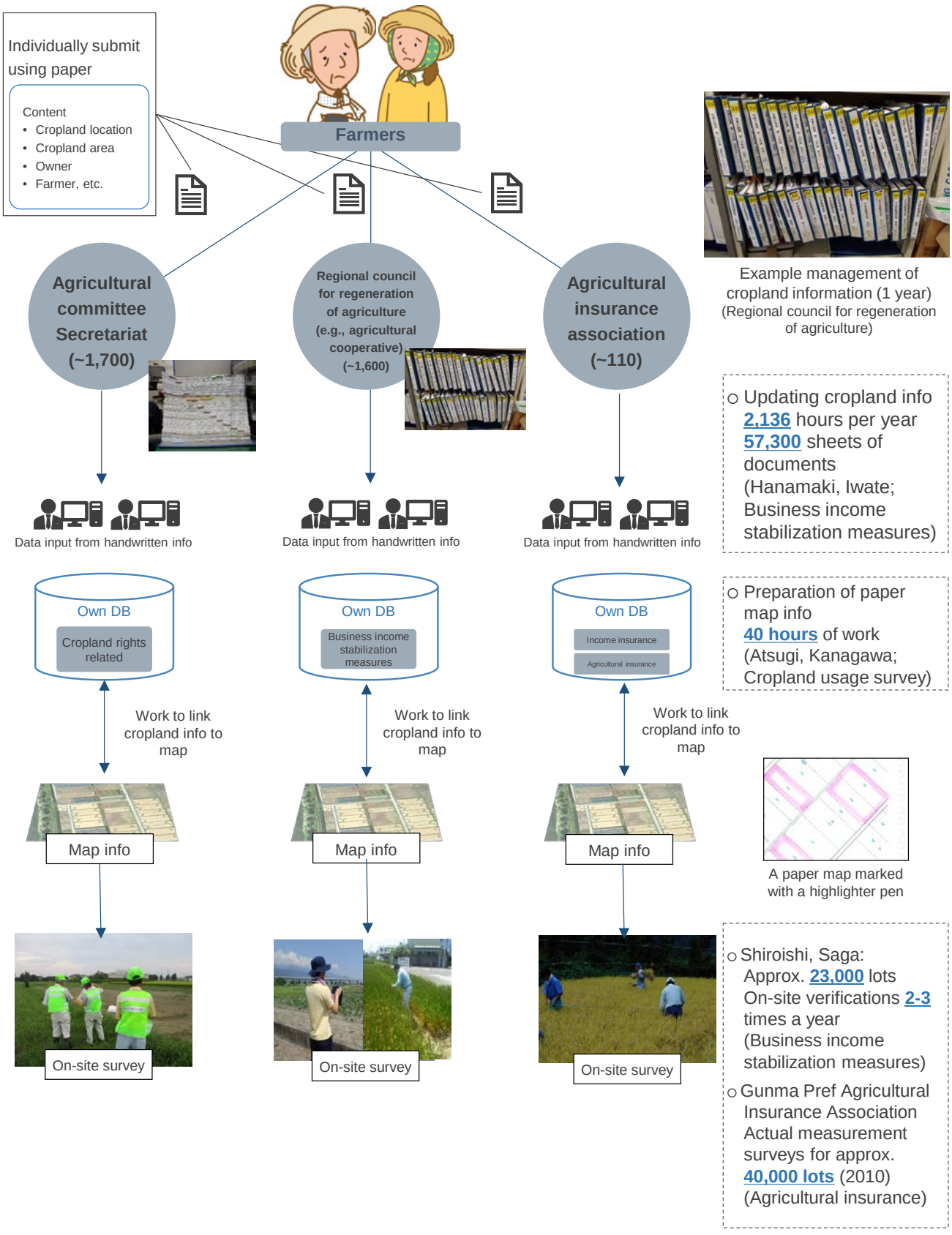

Figure 15: Current situation and problems of cropland information management

2.2 Centralized cropland information management and existing systems

Some systems (e.g., ALIS-AC, Midori Information System) are currently available for the management of cropland information, but their use is limited to applications necessary for achieving relevant policies. As a result, information on these systems may differ from the actual cropland information, and only the information for the region may be registered in the systems. Unfortunately, the existing systems do not provide centralized management of cropland information across various platforms.

- Agricultural Land Information System Agricultural Committee (ALIS-AC)

ALIS-AC is a nationwide centralized cloud system for digitizing, mapping and publishing cropland information based on cropland ledgers prepared by agricultural committees, etc., at municipalities, to be used as reference information by new entrants and for intermediary institutions that manage cropland to integrate and consolidate cropland. ALIS-AC allows displaying cropland polygons (cropland lot information) and cropland pins (representative cropland points) over a map or aerial photograph, and users can see detailed information (e.g., location, lot number, land category, area) of the cropland polygon or cropland pin.

However, as discussed in Subsection 2.1.1, the cropland information provided in ALIS-AC is not always up to date, and for the cropland polygons in ALIS-AC, some agricultural committees, etc., are unable to receive the source data, the lot number maps owned by the municipal tax department. Because of that, the progress in the development of ALIS-AC is only around 40% (as of November 2018).

The cropland pins are created based on (new) cadastral maps if cadastral surveys[3] are conducted, or based on the *Kozu* (former cadastral maps) if not conducted. As such, the pins may be inconsistent with the actual situation, and are not designed to be used in other cropland information databases or on-site verifications.

[3] A survey mainly led by municipalities under the National Land Survey Act to investigate the landowner, lot number, and land category for each lot and to survey the location of boundaries and land areas.

“Drawing equivalent to map (*Kozu*)” and “map kept at registry office” in real estate register

A former cadastral map, as stipulated as “a drawing equivalent to a map” by Article 14, paragraph (4) of the Real Property Registration Act is a map prepared mainly in the Meiji era for the purpose of collection of taxes, which is kept at the Regional Legal Affairs Bureau as a replacement of a map stipulated by Article 14, paragraph (1) of the Real Property Registration Act until such a map is made available.

A map kept at a registry office is a drawing which is greater in accuracy in terms of the land area, distance, shape, and location, and in which boundaries can be restored within a certain range of errors, available in:

[1] a (new) cadastral map prepared by cadastral surveys;
[2] a drawing showing the location of lands prepared under the Land Improvement Act, Land Readjustment Act, etc.; and,
[3] a map prepared by a Regional Legal Affairs Bureau.

- Midori Information System

The Midori Information System (the term Midori (= green) is coined using three Kanji characters meaning water, land, and rural area) is a collective term for geographical information systems individually managed and operated by each Prefectural Federation of Land Improvement Association, which mainly has aerial photographs, topographical maps, as well as specification information and maps of cropland lots and agricultural irrigation facilities. The system is used for prefectures, municipalities, agricultural groups, etc., to check the status of cropland integration, check the status of farming, gather information on the current status of facilities, and plan on farming. However, the system is individually operated by prefecture, and the usage varies depending on the region.

- Individual system at local governments

Some local governments use their own systems to manage cropland information for various institutions, resulting in using multiple systems at the same time. For example, Hanamaki City in Iwate Prefecture uses the agricultural map information system primarily consisting of farming information that was introduced through the agricultural structure improvement project, etc., and the administrative farming map information system created based on the land tax information, in addition to ALIS-AC. Hanamaki City uses them according to the institution or their purposes, while receiving map information of the Midori Information System from land improvement sections where necessary. Data in these systems are managed separately without linking, making it extremely difficult to see which data are the latest and therefore the data are often left inconsistent.