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Inventory and Classification of Agricultural land Resources in Taiwan

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Outline

1. Introduction
2. Agricultural land resources inventory
3. Classification of agricultural area
4. Management strategy of agricultural land
5. Conclusion

1.Introduction

- The land of Taiwan:
  - 36,000 K㎡, 70% belongs to the hillside, 30% belongs to the plain area.
- The agricultural land is decreasing :
  - the rapid urbanization, industrialization, competition of land for other uses, and pollution etc.
  - rainstorms, droughts, typhoons and other natural disasters occurred frequently in recent years.

Environmental impact, food production, resource conservation and food security are important issues in Taiwan's agriculture land.

1.Introduction

- For the sake of improving the agriculture land use and food security matters, nationwide agricultural land use and food security conferences have been held in Jan. and May 2011.
- The conclusions and suggestions include:
  - to raise the self-sufficiency ratio of food.
  - to conserve and protect prime agriculture land for food production.
  - set up the agriculture land use policy, and maintain the good productive environment actively.

In order to comprehend the present use of farmland as a basic data for land use planning and agricultural land management, the inventory of the nationwide farmland and the classification of the agricultural land were conducted in late 2011.

2. Agricultural land resources inventory

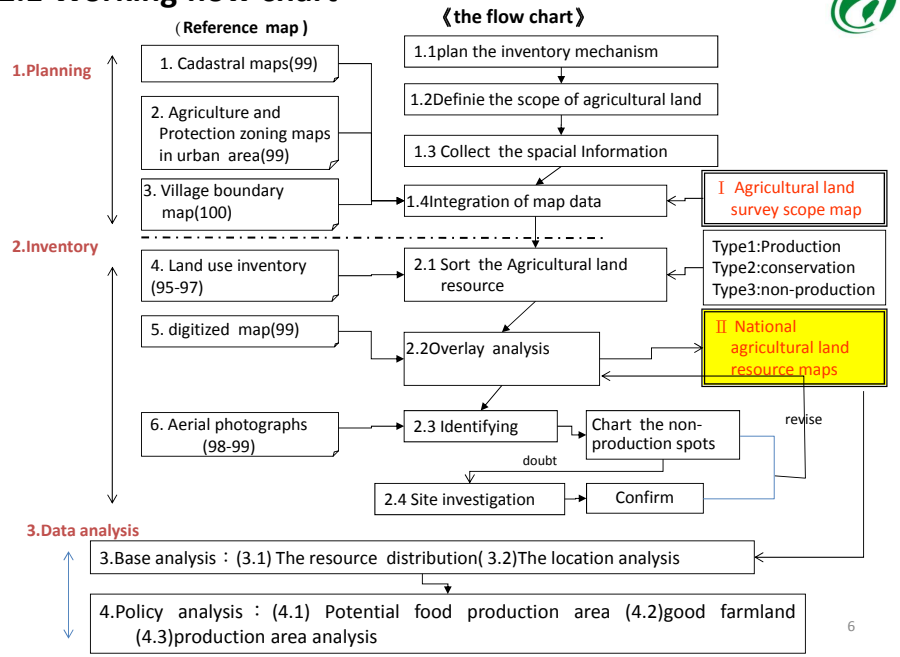
➢ The purpose of the inventory:

- To know the status and distribution of current agricultural land resource for the consideration of food security .
- The inventory is not to survey the crops on the farmland, but to investigate the location which deserves for cultivation and the location is over developed for agriculture facilities, farmhouse or other buildings.

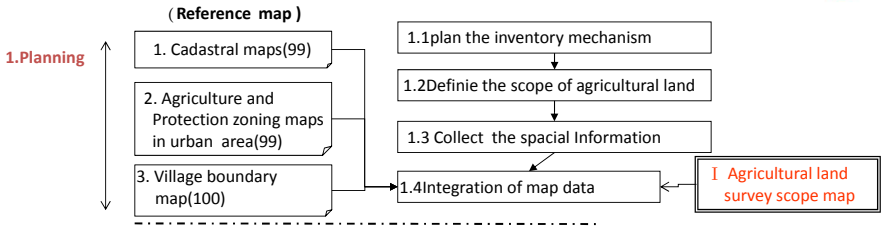
➢ Method:

- Collects relevant maps from other agencies.
- Applies the GIS technique to preliminary define the three kinds of agriculture land (production, conservation, and non-production land) .
- The preliminary result has been double checked by field investigation and aerial photographs.

2.1 Working flow chart



2.1.1 Planning stage (Preliminary Analysis)

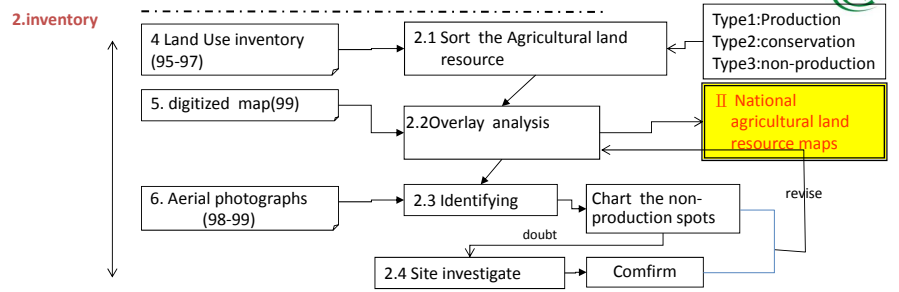


➢ This is a stage of preparations.

➢ The work in this stage includes planning the overall schedules, defining the scope of the inventory, collecting the relevant maps which were made by other agencies.

➢ These data embrace the cadastral maps, agriculture and protected zones of urban planning area, municipalities (counties) boundary maps, land use map, digitized map, and aerial photographs.

2.1.2 Inventory stage



A. Classification of the agricultural land resource

➢ With the cadastral map, land use map and the urban planning map, the boundary of agricultural land can be drafted.

➢ Based on the results of the 2nd national land use inventory, the agricultural land resource is classified into the production, conservation, and non-production of agricultural land.

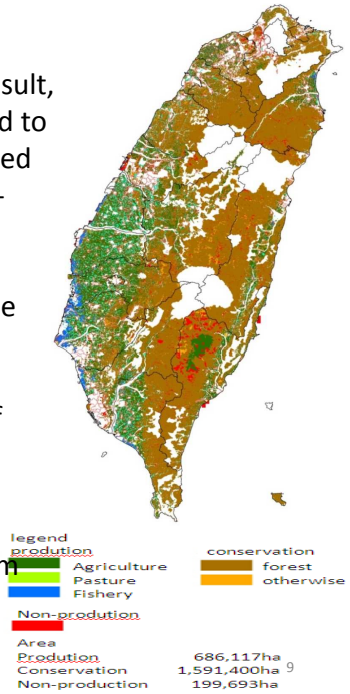
➢ The digitized map which was done in 2010 is used to identify the non-production spots, and then the map of the agricultural land resources is accomplished.

B. Interpretation of the aerial photograph

- In order to improve the accuracy of the result, the latest aerial photograph has been used to distinguish the differences with the digitized map and identify the new location of non-agricultural use.
- Satellite image is not used to analyze the variation due to the lack of precision of the satellite images for spatial analysis.

C. On-site checking

- If the plot is difficult to judge the status of production or non-production, on-site checking is used to check the situation.
- The on-site checking is carry out by the township official, and then the official from county government makes a spot check randomly.



2.1.3. Data analysis stage

3.Base analysis：(3.1) The resource distribution(3.2)The location analysis

4.Policy analysis：(4.1) Potential food production area (4.2)good farmland (4.3)production area analysis

- The result of the inventory are used to do some basic statistic analysis, such as the area of the farmland and the location of the agricultural land resource.
- The result also has been used to make some policy analysis, such as potential food production areas, the boundary of the good agricultural land and agricultural production location.

2.2Preliminary results

- The result shows that agricultural land surrounding the metropolitan areas or close to the main roads or large development areas, its fragmented or abandoned situation is more serious than in other regions.
- In the future, for the case of converting agricultural land to urban development, the location should be considered whether it will cause fragmentation of agricultural land resources or not.

3. Classification of agricultural area

- The purpose of classification
  - For ensuring food security.
- The scope of classification
  - Only the land in the main agricultural area has been classified.
  - Forest or environmental sensitive areas, such as disasters sensitive areas, wildlife protected areas etc. are not included.
  - Besides, the classification is based on the conditions of the productivity and location of agricultural land, in order to map out the high quality of agricultural production area, and the suitable ways of agriculture land use.

3.1 Classification principle

- The classification of agricultural area is evaluated based on the conditions of the production and location of the agricultural land.
- Four types of agricultural productive areas are categorized.

Class	Definition and characteristics
Class I	With good agricultural production environment, and has invested the constructions of major agricultural facilities.
Class II	Still suitable for cultivation, and has the function of food production.
Class III	Still suitable for cultivation, but is affected by the external factors, such as neighboring the industrial zone, science park, or the highways and interchanges.
Class IV	Located at the hillside for cultivation, but not in the environmental sensitive areas.

3.2 Process of classification

(1) Defined the boundary of farmland

➢Only the land within the agricultural areas are for evaluation and classification.

(2) Collect maps

➢Some of those data have been collected via agricultural land resources inventory ,some were from other agencies.

(3) Develop the classification criteria

➢Criteria for classification are discussed through many times of the expert consultation .

(4) Grading principle

➢The sequence of delineation is the class I, the second one is the class III and class IV, the last one is the class II.

(5)Results review

3.3 Classification criteria and designation of agricultural areas

(1) **Criteria**

Class	Characteristics	Mapping Criteria
Class I	(1) With good production environment	• Important Agricultural Development Area
	(2)Maintain food security	• Rice suitability class I or class II areas • Hillside classification criteria is class I to class II
	(3)Has invested in major improvements in agriculture facilities	• Irrigation area • Important agricultural operations area or agricultural production areas
	(4)Large-scale and full of agricultural land	• Agricultural land greater than 25 hectares and % of the agricultural use is greater than 70%

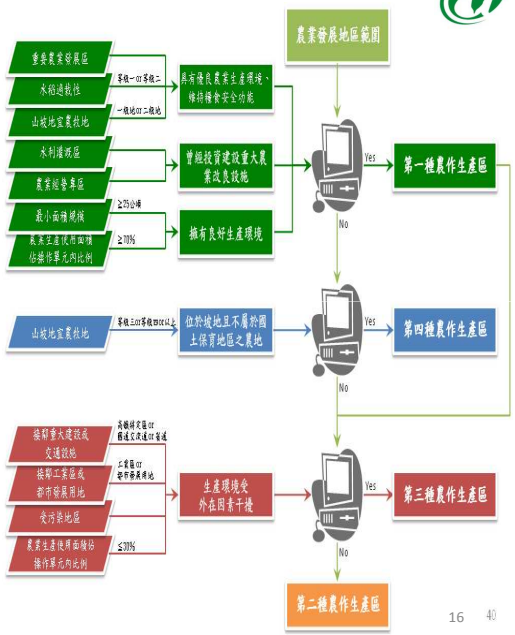
Class	Characteristics	Mapping Criteria
Class II	(1) Still has good agricultural production environment	• The same with Class I
	(2)Not reach a certain size or the situation is scattered	• Agricultural land less than 25 hectares or the agricultural use less than 70%
Class III	(1) can produce the food of agricultural land	• Agriculture use
	(2)Vulnerable to external factors interfere with agricultural land	• Neighboring the specific area of the high-speed rail, Interchange, Industrial Zone, Science Park, Urban development areas, and the use of agriculture is less 30%.
Class IV	• located in hillside and does not belong to the conservation areas	• Hillside classification criteria is class III to class VI and not in the conservation area.

(2)Analytical methods

➢The Factor combination method is adopted in this analysis.

➢The evaluation criteria have been organized according to their characteristics, resulting in a variety of combinations, to define different of classes of the agriculture areas.

➢In addition, the software of Arc GIS is used to analyze the spatial data.

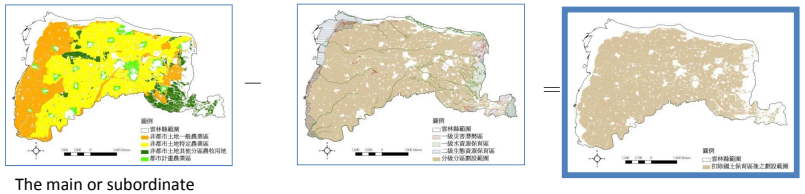


3.4 The example result of classification

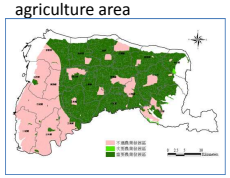
Yunlin County was selected as a pilot project.

- It is one of Taiwan's major food production county, with 20 townships and 130,000 hectares of land.
- 78% of the land is located at plain area, and the other 22% at sloping area. The area of agriculture land is about 93,000 hectares, for growing rice, grains, vegetables and other crops.

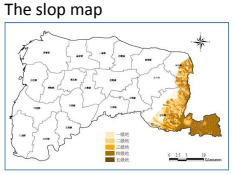
The scope of agriculture land — The conservation area = **The agriculture area**



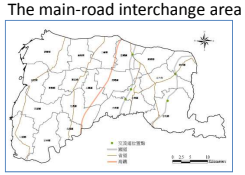
The main or subordinate agriculture area



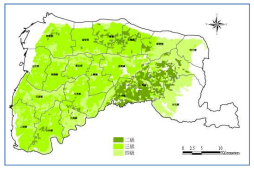
The slop map



The main-road interchange area

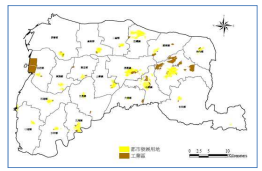


The suitable area for rice map

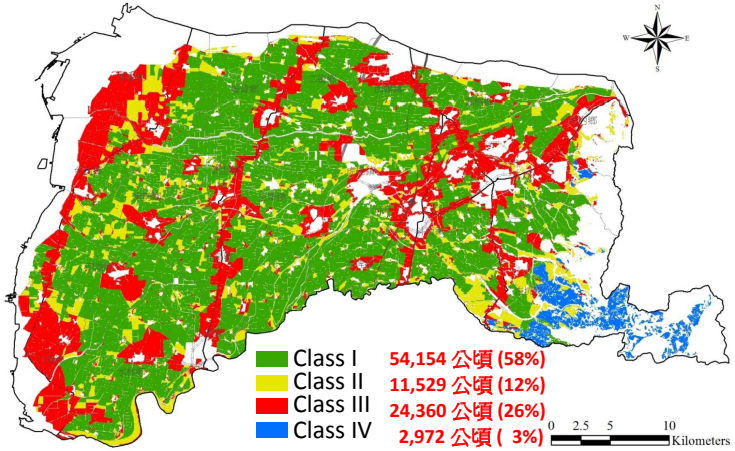


The irrigation map

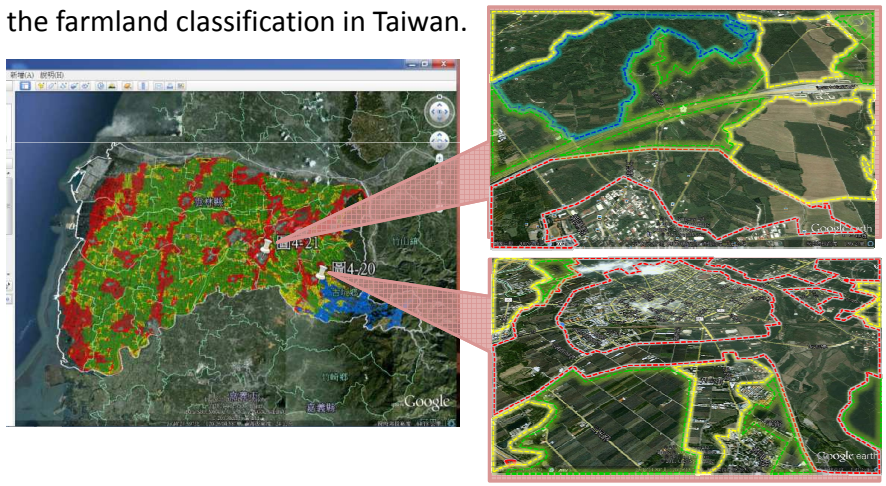
Urban or industry area map



- The result of the classification is as follows:



- **Spot checking**
  - The Spot checking includes the Google map and on-site inspection.
  - The Google map has been used to check the results firstly and by the official of county government to check on site.
- Through this inspection, it is confirmed that the analysis is good for the farmland classification in Taiwan.



4. Management Strategy of agricultural land

Class	Management Strategy
Class I	➢ The agricultural land in this class is primarily for food production. ➢ These areas are also the primary areas need to be actively engaged in public facilities for agricultural production by the Government, e.g. subsidies of production and marketing facilities, farmers counseling measures etc. in order to maintain agricultural production environment. ➢ Prohibit the conversion of agriculture land in this class to other uses. ➢ In case the conversion is inevitable, the buffer zone between the converted area and the agricultural area have to be set up to protect the agricultural production environment.

Class	Management Strategy
Class II	➢ This area is maintained for agriculture use as well. ➢ Some agriculture resources will also be invested to improve the agriculture environment, but mostly to support non-production use, such as leisure agriculture. ➢ When it is inevitable to alter the agriculture land for non-agriculture use, the feedback mechanism and the buffer area for conserving the agriculture land have to be designed and built up.
Class III	➢ The current situation is for agricultural use, but the region is suitable for large-scale agricultural marketing or processing facilities. ➢ The place can be allowed for converting to another use.
Class IV	➢ The region is located on the hillside but still good for agricultural use. ➢ The agricultural practice should not affect the eco-environment. ➢ Soil and water conservation are the first priority consideration.

5. Conclusion

- Taiwan had never conducted a comprehensive survey or land evaluation for agricultural land resource. This task compiled basic spatial data of agricultural land, and investigated the distribution of agricultural development region.
- The process of the inventory and classification is a reasonable process, the data correction and adjustment mechanism will be established, and the results can be applied into the agriculture policy making.
- The principle of designating agricultural areas is based on the conditions of production and the location of the agricultural land. The results can be used for choosing the land use , and guide the input of the resources into specialized production areas to maintain the high-quality agricultural land.
- In the future, continuing inter-ministerial communication and improving agricultural land management are important works for us to maintain the agriculture resources.