

## An analysis of land use change based on Ezu using GIS

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Techniques for survey are considered to be imported from Sui in the 7th century, in Japan. After 'Taiko Kenchi (General land survey which was conducted by Toyotomi Hideyoshi who is the first unifier in Japan at the end of 16th century)', land register survey was get to enforced frequently all over Japan. In the early years of the 18th century, precise survey maps were made due to the development of techniques for survey. The most famous map among them is 'Dainihon enkai yochi zenzu (means map of the Japan coastal areas)' which was made by Ino Tadataka. Besides, Kyuchi Ezu (map of land allowance) were made based on the unit at village in order to clarify the actual situation of land in Awa (present Tokushima Prefecture).

The purposes of this study are to grasp the situation of land use around 1840(estimated), and to clarify the characteristics and factors of the changes of land use from 1840 to 2004. A land use map can shows how each lot of land is used and how it works. Comparison of land use maps on several times allows us not only to clarify process of change, but also to mention changes of socioeconomic background which brought the change of land use.

The study area is Kan-onji district, the western part of Tokushima city in Tokushima Prefecture. The district is in the lower reaches of Akui River which is the tributary of Yoshino River. Although many farmlands can be found in the area, the purely rural village is changing due to the urbanization. Kyuchi Ezu of Kan-onji district has been well preserved. The original map is owned by individual and its copy is preserved in the Tokushima Castle Museum. Each lot of land was recorded in the map with the several information such as sort, class, area, harvest, and owner.

Quantitative measure of land use change area made by overlaying the land use layers as of 1840 and 2004, by using GIS. Process of works is as follows. 1) Kyuchi Ezu is calibrated (affine calibration) to a map in 2004, 2) each land lot in Ezu is digitized to make land use layer, 3) read out the farmland information from Ezu and add it to land use layer, 4) survey the present land use of the study area by fieldwork, 5) present land use layer is made and the land use information is added to the layer, 6) land use layers in 1840 and 2004 are overlaid and analyzed.

The major results of analysis are as follows:

1) The land use map of Kan-onji district in 1840 shows that topographical condition constrains human activities seriously. Houses and dry fields are agglomerated on natural levee while paddy fields lay lowland to surround them contradistinction is obvious between them.

2) More than 40 percent of paddy fields in 1840 were diverted to house lots and commercial facilities. On the other hand, few dry fields can be seen in 2004, because most of the dry fields were diverted to house lot.

3) Two ways of process can be found for disappearance of farmlands. Firstly, many houses have been built to the land with a few existed houses on the natural levee. Secondly, house lots and commercial lots were developed in the area along the road due to the urbanization.

4) Residual percentage of bad paddy fields is higher than that of good paddy fields. It is presumed that bad paddy fields are not suitable for residence because of its poor drainage.

As a result of analysis of areal transition for 160 years, the microcosm on change of people's life can be seen there. Although people used to live in harmony with nature, developments against nature have been increased today. Ironically, areas that were developed after 1840 have been often damaged by disaster, such as floods. The primary factor to cause them is sudden urbanization and increase of population since the district is included in the urban area.

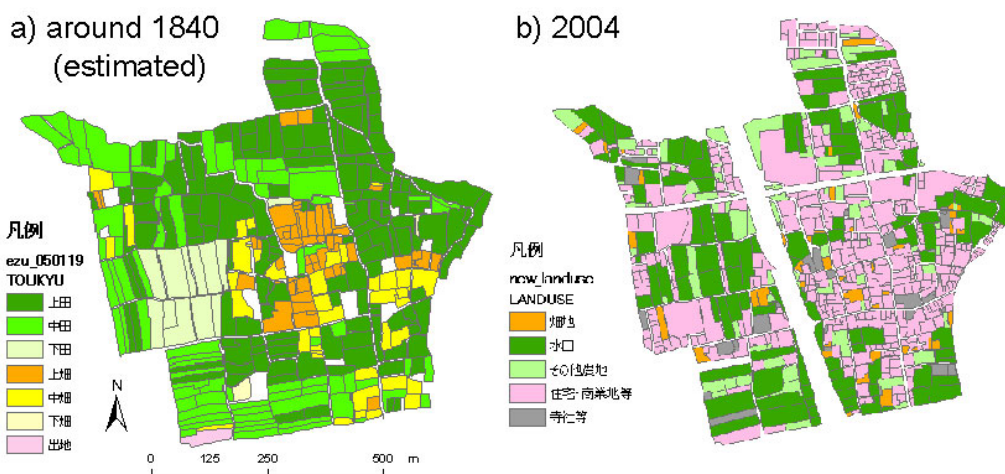


Fig. Land use of Kan-onji district