

Location of wells and groundwater distribution in Teshima Island, Japan. Environmental humanities approach and hydrological simulation

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I. Introduction

The islands of the Seto Inland Sea are prone to water shortages due to low rainfall amount and small isolated spaces. However, Teshima Island (14.4km², Fig.1), Tonosho Town, Kagawa Prefecture, is a unique place in terms of its water environment because it has a spring called "Karato-no-shimizu," which does not run out even in the period of extreme drought, and has a lot of rice paddy fields. Based on the relatively abundant water resources, people in the island have been utilizing the tube well. For this, the well might have an important role but these characteristics have not been described in detail in previous studies.

II. Method

This study focuses on the wells, which have been used as a source of water for daily life, and aims to elucidate location of wells and changes in their use in Teshima Island. In addition, the use and location of wells are also related to the hydrological cycle such as precipitation, infiltration, underground storage and river runoff. In this study, both of environmental humanities and hydrological approaches were demonstrated. As an approach to environmental humanities, we conducted field surveys and interviews to the people living in Teshima Island about the distribution of wells and the changes in their use. As a hydrological approach, the hydrological cycle in Teshima Island, especially the groundwater distribution, which is strongly related to wells location, is estimated by using the two hydrological models: RRI (Rainfall-Runoff-Inundation) Model and GETFLOWS (General purpose Terrestrial fluid-FLOW Simulator).

III. Results & Discussion

We showed the distribution and usage of wells in Teshima Island, which were found by the field surveys and interviews. The field survey was conducted twice in September and December 2020, and a total of 57 wells were identified (Fig.1). Most of the wells are used as the household well, except the common-use well, and electric well pumps are used to pump up the water (Fig.2). Currently, the piped water supply coverage ratio is over 95% in Teshima Island, and most of households do not use the well water for drinking. Before the construction of the piped water supply system, the well water has been used as a source of water for domestic use including drinking, but it seems to have been gradually out of use due to problem of the water

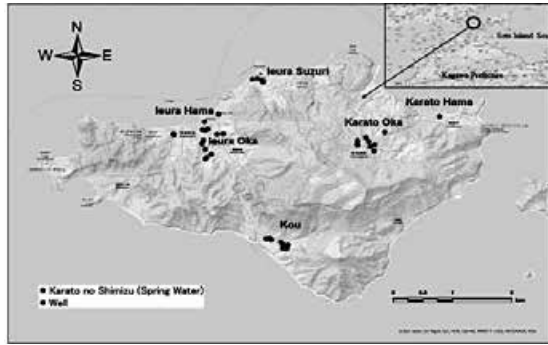


Figure 1: Locations of "Karato-no-Shimizu" and wells in Teshima Island



Figure 2: Household well and wash place at Ioura-Suzuri (2021.12.13)

quality. However, some households still use the well water for the purpose of watering plants and vegetable, removing mud, and other outdoor uses.

IV. Concluding Remarks

The field survey partly revealed the distribution of the wells, their uses, and their change in Teshima Island. Even now, after the construction of the piped water supply system, some households still use the wells on a daily basis, and this gives possibility that the well water can be used for different purposes, such as drinking and outdoor uses as it used to be. Though, this study does not investigate all wells and there are many unknowns, including the timing of changes in the well pumping methods and the seasonal fluctuations of the well water levels. We will continue to investigate not only the well's characteristics but the hydrological cycle in the island, including the estimation of groundwater distribution using the hydrological models. We will show some preliminary results of the hydrological simulations at the poster presentation in October.

V. References

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