Symposium Report

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Building a Sustainable Water Resource Utilization Model in Egypt's Western Desert — Report on the SATREPS International Joint Research Symposium —

This project aims to develop a sustainable water resource utilization model based on groundwater for the Dakhla and Kharga oases in Egypt's Western Desert. At this symposium, reports were presented from diverse fields, including the historical and cultural background of oasis societies, the impact of excessive water use and salt accumulation on agricultural sustainability, and analyses of land-use changes using satellite data. Additionally, examples of data sharing through digital platforms and AI-based analysis were introduced, and discussions focused on problem-solving approaches involving local community participation. Furthermore, the importance of social systems based on the concept of "commons" and the outcomes of participatory workshops held in Cairo were highlighted, presenting new forms of collaboration that connect scientific knowledge with local communities.

Overview

- Explanation of the general significance of the international project focusing on oasis societies in Egypt's Western Desert
- Development of a sustainable water resource utilization model
- Issues of water resource use in agriculture in Dakhla and Kharga oases (excessive water use)

What is an Oasis? — Iwasaki

- Oasis is often imagined together with desert: desert = emptiness/death, oasis = water/life
- Actual oases: associated with towns, villages, and cities
- Geography: spring-fed oases, foothill oases, oases along external rivers
- Development of irrigation and well-drilling technologies; hubs for exchange and trade: cultural diversity and uniqueness

- Further development: involvement of communities, states, and corporations
- Global challenges: declining groundwater levels, expansion of drainage lakes

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Saline Water and Agricultural Sustainability — Yoshida

- Agricultural water sources in oases are 100% groundwater: Nubian Sandstone Aquifer
- Groundwater quality: TDS 100–200 mg/L, 40°C, high iron content
- Suitable for agricultural use
- Key issue in arid land irrigation: salt accumulation due to capillary action
- Salt concentration rate = inverse of the proportion of water drained from the bottom
- If a high-salinity water layer exists in the lower strata, salt accumulation occurs: drainage is essential
- In Egypt, drainage channels and lakes are maintained, but high groundwater levels cause salt accumulation
- Drainage lakes pose a high risk of infiltration into free groundwater
- Management of cultivated area, water intake, and public infrastructure is crucial

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Oases in the Global Era from a Land-Use Perspective — Hama

- Land cover changes in oases
- Analysis of all Landsat satellite images from 1984 to 2024
- Area changes correlate with social changes
    - 2008: Global food crisis
    - 2011: Arab Spring
    - 2022: Ukraine invasion
- Sustainable agriculture: regional differences exist
- Japan’s agriculture: shortage of farmers, increase in abandoned farmland
- Oasis agriculture: population growth, depletion of water resources, increase in abandoned farmland due to salt accumulation

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Potential of Digital Platforms — Lessons from Fukushima — Mizoguchi

- Digital platform: foundation on the internet that supports backend interactions
- Cloud data analysis: digitization of legacy data (e.g., historical documents)
- Fukushima case: analysis and sharing of field photo collections, outdoor monitoring data, and real-time materials
- Use of generative AI: AI chatbot (Oasis-kun: https://wayo11.github.io/Oasis-kun/)
- Database shared with ChatGPT: ChatGPT generates answers and analyzes data

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Social Systems Supporting Sustainable Water Use — Commons — Sugiura

- Commons: shared resources
- Examples include “tragedy of the commons”
- Important concept in the process of rule-making and consensus-building
- Wisdom in water distribution agreements: water-dividing channels
- Water-dividing channels also seen in Sado City
- Personal interest: In Oita Prefecture, there is a circular water-dividing device called “Enkei Bun-sui,” which uses the siphon principle for “equal” water distribution (probably from the Meiji era?). If water-dividing channels play a role in consensus-building for shared resources, could such physical phenomena-based equality hold meaning as “scientific fairness”?

Toward Community Organization — Examples from Cairo — Fukami

- Considering sustainable communities based on historical architecture and traditional housing styles
- Workshops conducted separately for men and women
- Low awareness of waste issues in Cairo
- Workshops on the use of terakoya (traditional schools) and water supply facilities
- Compilation of workshop outcomes into booklets and posters
- Recording and reporting workshops are crucial for community organization: digital platforms are key
- Local issues require local residents’ awareness and opinions; otherwise, solutions remain theoretical