

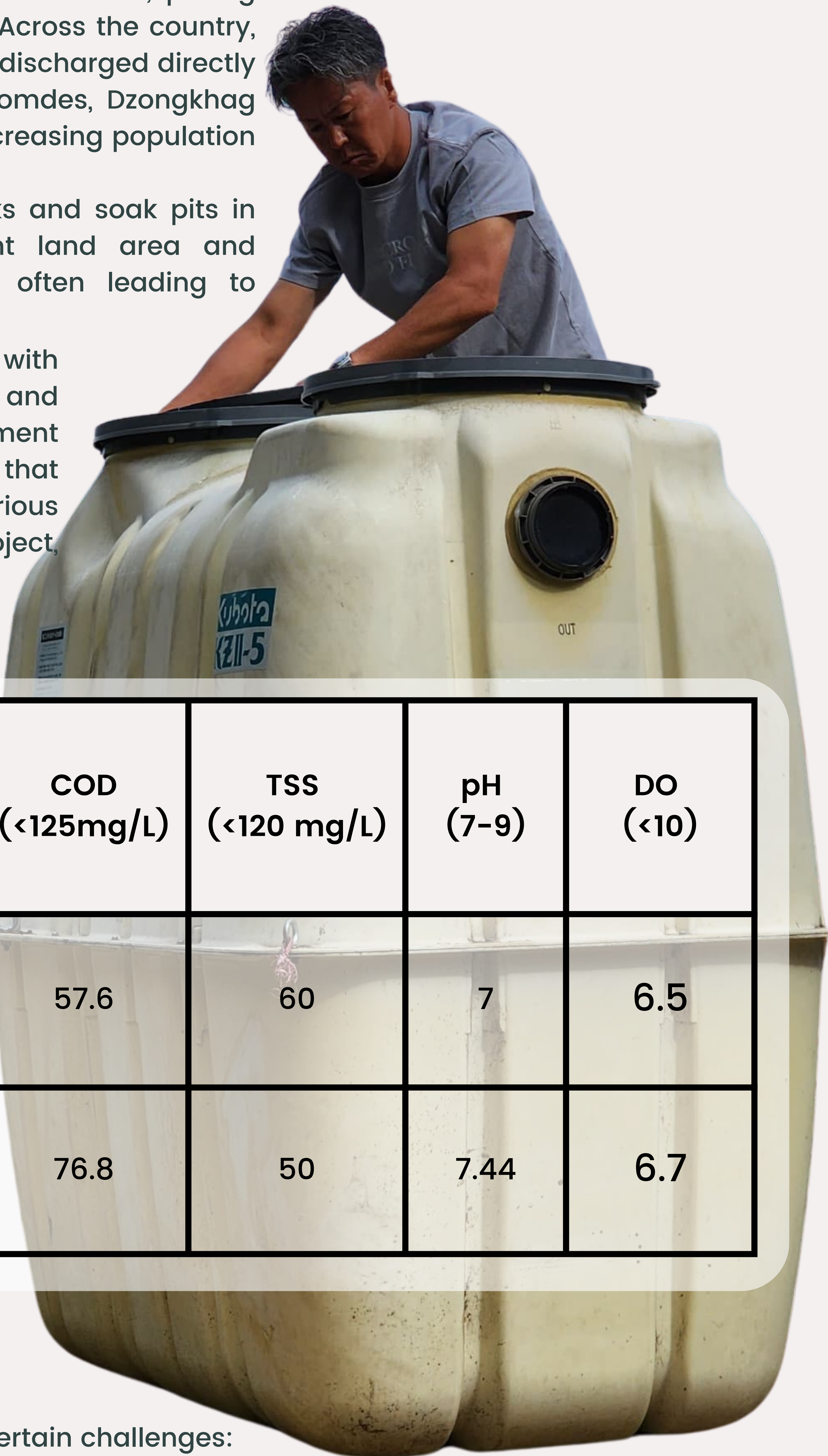
PILOTING JOHKASOU TECHNOLOGY IN THIMPHU, BHUTAN

INTRODUCTION

Wastewater management has emerged as a critical urban sanitation challenge in Bhutan, posing significant risks to public health and contributing to the pollution of river systems. Across the country, more than 80% of households rely on onsite sanitation, with wastewater often being discharged directly into drainage systems without adequate treatment. Urban centers, including Thromdes, Dzongkhag Thromdes, Yenlag Throms, and peri-urban areas, are particularly affected due to increasing population density and limited access to public sanitation services.

The situation is further exacerbated by the lack of properly designed septic tanks and soak pits in buildings with onsite sanitation. Conventional septic tanks require significant land area and compliance with setback regulations outlined in the Bhutan Building Code, often leading to compromises in the quality and functionality of these systems.

To address these challenges, the Bhutan Toilet Organization (BTO), in collaboration with Thimphu Municipality, piloted the Johkasou Tank technology with technical and financial support from Joylet Japan. Johkasou is a decentralized wastewater treatment system with a long-standing history in Japan. It operates on the circulation system that makes it possible to repeat nitrification and denitrification process available in various sizes, including household, community, and large-scale units. As part of the pilot project, two household-scale Johkasou tanks were installed in Motithang, Thimphu.



PERFORMANCE EVALUATION

The effectiveness of the Johkasou system is influenced by multiple factors, including ambient temperature, wastewater composition, and operational conditions. Hence, a pilot study was essential to assess its performance in the specific environmental and socio-economic context of Thimphu.

Over a six-month monitoring period post-installation, effluent quality tests were conducted. The results indicated that all key wastewater parameters remained within the permissible limits, as summarized in the table below:

Tank	BOD (<30 mg/L)	COD (<125mg/L)	TSS (<120 mg/L)	pH (7-9)	DO (<10)
T1	22.4	57.6	60	7	6.5
T2	27.2	76.8	50	7.44	6.7

CHALLENGES AND RECOMMENDATIONS

- Despite its promising performance, the adoption of Johkasou technology presents certain challenges:
- **Initial Investment:** The upfront cost is relatively high, with a monthly electricity consumption of Nu. 35. However, the long-term benefits, including space efficiency, environmental sustainability, and the potential for wastewater reuse in gardens, outweigh the initial costs.
 - **Technical Knowledge and Maintenance:** Given that this is a novel technology in Bhutan, specialized knowledge is required for installation and maintenance. To encourage wider adoption, capacity-building programs, technical training, and private sector engagement are recommended.
 - **Applicability in Urban and Peri-Urban Areas:** The Johkasou system is particularly beneficial for urban and peri-urban residents who lack access to centralized sewer networks. Its scalability makes it a practical solution for wastewater management in areas experiencing rapid urbanization.

CONCLUSION

The initial pilot of the Johkasou technology in Thimphu demonstrated successful performance under local conditions. With appropriate government subsidies and policy support, Johkasou tanks have the potential to become a sustainable wastewater management solution for urban and peri-urban areas lacking centralized sewer systems. Further research, coupled with community engagement and private-sector involvement, will be crucial in scaling up this technology to address Bhutan’s evolving sanitation needs.

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