



Title of the presentation: Linked natural resource management: Examples from Hawaii and Japan

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Short biography

Kimberly Burnett is faculty member with the University of Hawaii Economic Research Organization. Her primary research interests include environmental and natural resource economics, invasive species management, and watershed management, particularly for Hawaii and the Pacific. Kimberly's publications and extramural grants have focused on invasive species and watershed management, groundwater management and the value of watershed conservation.

Abstract

Natural systems in Hawaii and Japan share similar linkages regarding the relationship between management of land and sea. For example, in Hawaii the abundance of economically and culturally significant marine species has been shown to be related to nearshore water quality, which is often directly related to groundwater levels and corresponding management actions such as groundwater withdrawals and the protection of upland forests (Burnett et al. 2017, Wada et al. 2020). In Japan, withdrawal of groundwater may have important implications for economically and environmentally significant coastal fisheries (Burnett et al. 2018). Using a case study from both Hawaii and Japan, in this lecture I will discuss the importance of explicitly recognizing how natural systems are related, and jointly managing these resources in order to maximize economic, environmental, and social benefit.

In the first set of case studies, data from the Kiholo aquifer on the Kona Coast of Hawaii Island are used to numerically illustrate optimal joint management strategies and test the sensitivity of those strategies to variations in physical and behavioral parameter values. The main result is that protection of a culturally important algae species reduces net present value by \$12 million, but optimal investment in watershed conservation may offset that potential reduction by \$8 million.

In Japan, groundwater is used for a variety of activities, including household consumption, agriculture, and manufacturing. In Obama City, Japan for example, groundwater is used to melt snow (~13% of total groundwater use) during the winter, the remainder being used for mostly domestic purposes, such as drinking water. In this lecture I will discuss benefits and costs of this practice, given concern about the impacts of this snow-melting practice on nearshore marine resources. We find that the net benefit of continuing to use groundwater for snow-melting becomes negative only if the impact on fishery productivity is substantial.

Improving the understanding of connections spanning from mountain to sea and integrating those connections into decision models have been increasingly recognized as key to effective coastal resource management.

Burnett, K., C.A. Wada, M. Taniguchi, R. Sugimoto, and D. Tahara. 2018. Evaluating the Tradeoffs between Groundwater Pumping for Snow-Melting and Nearshore Fishery Productivity in Obama City, Japan. *Water*, 10, doi:10.3390/w10111556.

Burnett, K., C.A. Wada, A. Endo, and M. Taniguchi. 2017. The Economic Value of Groundwater in Obama. *Journal of Hydrology: Regional Studies*, 11: 44-52. doi:10.1016/j.ejrh.2015.10.002

Wada, C. A., S. Pongkijvorasin, and K. Burnett. 2020. Mountain-to-sea ecological-resource management: forested watersheds, coastal aquifers, and groundwater dependent ecosystems. *Resource and Energy Economics*, forthcoming.