

Impact of Rapid Tourism Growth on Water Scarcity in Bali, Indonesia

○Eva Mia SISKI, Takahiro SAYAMA, Kaoru TAKARA

Background

Bali economy was increased almost ten folds in 16 years (1997-2013) (Bali Province Statistical Agency) and 30% of Bali economy depends on its tourism industries, which is well known as its over-use of water. Despite of its contribution to the Bali's economic growth as well as 481,000 jobs, there are increasing complains from local populations on discontinuity of clean water supply in the vicinity of tourism areas (Trisnawati, 2012). Issues on water scarcity due to rapid tourism growth are well covered by the mass media, however, there has been very little academic research, which looks into the impact of tourism development to the water scarcity in Bali. This study aims to clarify whether the rapid tourism and population growths have caused water scarcity in Bali. This study calculated water demand (inter-annual, spatial and seasonal) before and after tourist development based on the official statistical data from Bali Province.

Methodology

As the first step before data collection, this study determined the year when the tourism rapid development started by examining the increase of tourist visits based on available data from "Bali Dalam Angka" (Bali in Numbers) published by Bali Province Statistical Agency.

The calculation of tourism water demand was made according to hotel/accommodation classification due to the fact that consumption of water increases exponentially with the size of hotel/accommodation (Gössling, 2001).

Although the focus of this study is to clarify the impact of rapid tourism growth to water situation in Bali, we also calculated the increase of domestic water demand.

Finally, In order to clarify the impact of tourism water demand to the water scarcity in Bali, this study compared the calculated water demands for domestic and tourism with the clean water production capacity.

Results

Based on the increase of tourist visits in Bali, we decided the initial rapid development of tourism in Bali was started in 1988. This year is the base year to compare the recent condition to the condition before tourism development.

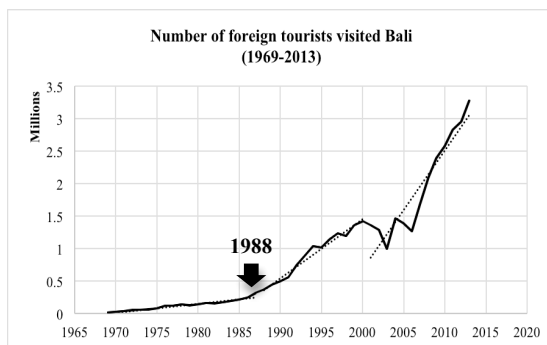


Figure 1. Rapid increase in tourism development

The calculation results show there were 305% increase of water demand in tourism and 48% increase in domestic water demand in 26 years (1988-2013). The demand of these two sectors in Bali changed from 105.8 million m³ in 1988 to 173 million m³ in 2013.

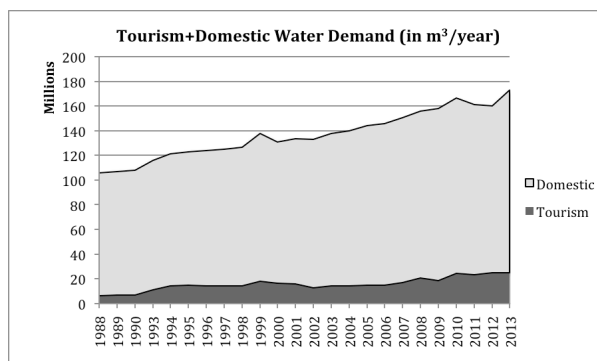


Figure 2. Tourism and domestic water demand in Bali

Moreover, the highest increase of both tourism and domestic water demand was found in Badung Regency (25.6 million m³) followed by Denpasar Regency (20.2 million m³). The increase in these two regencies accounted for 67% of total increase for tourism and domestic water demand of whole Bali.

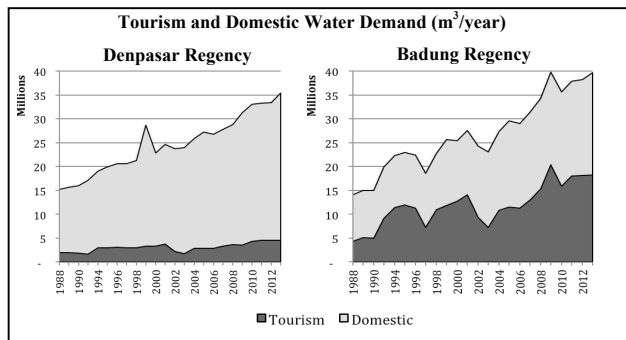


Figure 3. Water demands in Badung and Denpasar Regencies

Total tourism and domestic water demand from the two regencies increased from 28.7 million to 73.6 million m³. Figure 3 shows that the increase of water demand in Denpasar Regency is mainly because of the rapid increase in population, while in Badung Regency, both rapid development in tourism and population caused the rapid increase in water demand.

In order to clarify whether the rapid growth in tourism caused water scarcity, this study compare water demand and clean water supply in the two regencies before and after rapid growth in tourism. In 1988, the production capacity of clean water supply in Badung and Denpasar Regencies was only 295 l/s while water demand for tourism and domestic was 934 l/s. The water supply could only cover 31.6% of these demands. Furthermore, in 2013, the clean water supply capacity for Badung Regency increased to 1,129 l/s and the water demand was 1,215 l/s. For Denpasar Regency, the clean water supply capacity increased to 1,178 l/s while the water demand was 1,125 l/s. Thus, in 2013 the coverage of clean water supply (for tourism and domestic demands) reached more than 90% for both regencies.

This study also calculated seasonal demand variation, in particular during high tourist season. The monthly water demand average from 2004 to 2013 is shown in Figure 4.

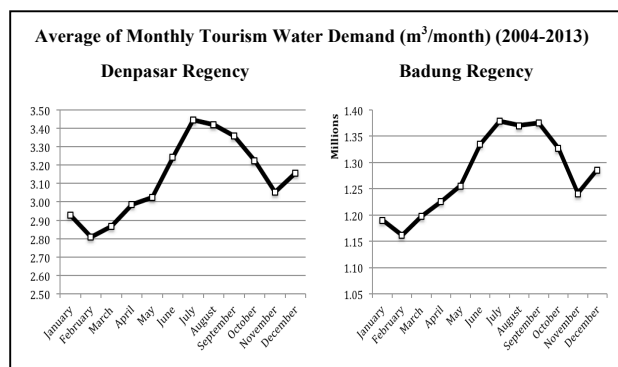


Figure 4. Monthly tourism water demand

The figure shows that the highest monthly tourism water demand is during months of July, August and September. In 2013, the highest monthly water demand (for tourism and domestic) was in September. In Badung Regency, the highest water demand was 1,310 l/s and in Denpasar Regency was 1,123 l/s. In Denpasar Regency, the water supply capacity was still enough to cover the monthly seasonal variation. However, in Badung Regency the production capacity could only covered 86% of water demand in September 2013.

The above results show that the increase tourism water demand is high in Badung and Denpasar Regencies, however, the significant portion of the water increase was mainly caused by population growth. The comparison with clean water supply shows that compare to the water supply condition in 1988, the clean water supply is much better in the recent years. These two results clarifies that rapid growth in tourism is not the main cause of clean water scarcity in Bali.

The above results also indicate that regencies with the highest increase of tourism water demand have the highest increase in domestic water demand. Thus, the rapid population growth may be the results of high economic development, which was indirectly caused by development in tourism.

This study suggests that further study to clarify the reasons of water scarcity complains addressed by local population should be done. Such research includes change in lifestyle and the reliability of clean water supply services.

