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**External Examiner****Abstract**

Koh Chang Marine National Park is a popular tourist destination located off the east coast of Thailand. Coral reefs are one of the park's main attractions, and thousands of visitors from around the globe enjoy the opportunity to snorkel or dive in the park's clear, warm waters. Rapid growth in Koh Chang's marine tourism industry over the last decade raises concerns about the ability of some reefs to sustain a healthy and attractive environment. Ecological and social impacts associated with increased levels of marine recreation can transform and even permanently destroy both the character of coral reef ecosystems and the quality of the recreation experience, ultimately resulting in declines in tourism demand.

The broad objective of this study was to establish a baseline understanding of the social dimensions of the snorkeling industry in Koh Chang, Thailand, and to recommend a suite of management actions that will sustain economic benefits while still yielding the benefits of protecting aesthetic and biological values. The recreation carrying capacity, Recreation Opportunity Spectrum, and Limits of Acceptable Change concepts were used to guide and inform the research.

Data were collected using three primary methods: participant observation, unstructured interviews, and structured questionnaires. Personal observations and unstructured interviews allowed for an assessment of the park's environmental, social, and managerial settings. The tour operator questionnaire was designed to measure the size and

characteristics of the snorkeling industry, awareness of environmental impacts, and support for visitor management strategies. The questionnaire was completed by eight tour operators. The visitor survey was designed to gain an understanding of the demographics of snorkelers, satisfactions, knowledge and awareness, and crowding. The survey was completed by 716 snorkelers.

Results of the visitor survey suggest that snorkelers have a similar demographic profile compared with reef visitors in other parts of the world. Features of the snorkeling trip that had the greatest potential to add to, or detract from visitor experiences were related to the quality of the natural environment, a finding that is consistent with other studies of snorkelers and divers in coral reef settings. The social conditions were rated among the least important influences on visitors' experiences, a somewhat surprising finding as the number of other people is an important indicator of quality of the visitor experience in terrestrial environments.

Overall, visitors were generally satisfied with the physical, natural, and social conditions, but the degree of satisfaction varied among individual snorkeling trip features. The lowest levels of satisfaction were expressed for the social conditions and several features related to the quality and condition of the natural environment. Low levels of satisfaction were also expressed for a number of service features.

Results from personal observations, unstructured interviews, and questionnaires suggest that the environmental impacts of use may be significant. On a daily basis, reefs were touched, abraded, kicked, and stepped on by snorkelers, and these inappropriate behaviours can cause considerable damage to benthic organisms and the aesthetic appeal of the reefs. Tour operators' perceptions of impact were close to those defined in the recreation ecology literature, but operators may not be aware of the impact of their own behaviour on the marine environment. Over half of visitors perceived the impact of snorkeling on the reef to be "large/very large", suggesting that visitors have some awareness of the environmental impacts of use. The social impacts of use were also significant, as over 90% of visitors reported feeling at least slightly crowded, and 20% felt extremely crowded.

Study results also showed that snorkelers are not a homogenous group. Variability in visitor response was explained in part by the recreation specialization framework, and country of origin. Differences between visitors' level of commitment to snorkeling and the underwater world were apparent between specialists and generalists, and specialization

helped explain variability in environmental preferences, sensitivity to environmental impact, knowledge and awareness, and sensitivity to crowding. Visitors with different cultural backgrounds also had significantly different participation characteristics, satisfaction levels, knowledge and awareness, and crowding perceptions.

Snorkelers are not homogenous, but unfortunately, the recreation settings provided are. Results from personal observations and interviews suggest that tour operators provide a single, uniform type of snorkeling experience that can be characterized as undeveloped with low levels of regimentation and moderate to high levels of use. Given the variability in the visitor population, provision of a single recreation opportunity may leave many snorkelers less than fully satisfied.

This study identified several imminent threats to the quality of the visitor experience, reef conservation, and the sustainability of the snorkeling industry. Active visitor management planning and resource protection programmes are urgently needed to balance park uses with the capability of the reefs to sustain such use indefinitely. Recommendations that contribute to improved visitor management and reef conservation are provided.