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## Water, Tourists, and Community Equity: a scenario analysis for Destinations in the United States

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## **Extended Abstract**

### **(Provisional Title) Water, Tourists, and Community Equity: a scenario analysis for Destinations in the United States**

#### **Introduction**

Water resource management has long been a vital component of sustainable development. United Nations addressed the supply and sustainable management of water as one of the SDG priorities (United Nations, 1992 and 2015) centered around socio-economic and environmental assets. Globally, tourism has been increasingly adding to the water demand at destinations over the past two decades for a broad range of purposes. At destinations where tourism is among the largest economic sectors, a remarkable increase in water consumption could draw challenges to the water crisis. This so-called tourism-induced water stress is defined as the impact of increasing water consumption caused by tourism activities that lead to stress under decreased water availability and to deteriorated water quality as a result (Becken, 2014). On a global scale, tourism is a primary contributor to competing with the local water supply, causes and consequences tourism impact on long term water supply (Gössling, 2001, Garcia & Servera, 2003). At the destination level, there has been a complex and contextual relationship between tourism, the destination community, and the water resources management that could trigger competition or partnership depending varies among each destination (Cole, 2012, March & Wilkinson, 2009, Garcia & Cater, 2022). And consequently, lead to a threatening challenge to destination sustainability. There is growing literature on tourism-induced water stress, specifically on destination water scarcity and degradation of water quality that impacts the locals by affecting their right to access clean and sufficient water for basic living needs. Furthermore, the changing in the patterns of water use may also enforce the change in their social and cultural practices.

On the other hand, the destination community's perception of tourism may also influence the destination's water resources. Precedent studies were primarily focused on the tourism and water relationship (Becken, 2014), as there has been a remarkable lack of research into the characteristics of the multivariate nexus among tourism, water and the community. Cole (2012) pointed out that the complex structure of stakeholders in a destination's water tourism nexus has been developed. By adding the community factors, the study may step into the unexplored realm of socio-political aspects of water equity. There have also been very few qualitative studies on tourism water scarcity at the destination level (Derman & Ferguson, 2000). As the water scarcity becomes exacerbated from the current to a more extreme climate scenario in the next one or two decades, the conflict and competition within the nexus may begin to impact a destination's long-term sustainability. Thus, conducting a destination scale study that scrutinize the complex characteristic of the nexus of water, tourists and the community contributes to the objectives of United Nations SDG towards the sustainable water management for all.

This study, therefore, builds on the assumption that the changing climate will influence the dynamic in the nexus between tourism, destination community, and water resources. At non-urban destinations where the tourism sector is a dominant part of the economy, understanding such a dynamic pattern is critical. Therefore, the study takes a scenario approach to investigate three U.S.

destinations and evaluate, under various scenario conditions, how broader and detailed stakeholders are conflicting and interrelated that shapes the nexus and the production over time and space (Belhooks, 1989). The scenario will build upon environmental factors such as precipitation, forest coverage, etc., and human factors under the status quo, moderate, and extreme future models. The research questions are as follows: (1) who are the water stress and conflict generators at these selected destinations? (2) What are the geo-political and policy discourses on water resource rights that shape the tourists' visitation, spending, and behaviors and the local tourism industry? And (3) How could destination policymakers set future water management structures that equally address the water right in fulfilling the needs of multiple stakeholders?

## **Literature Review**

### ***Tourism-Induced Water Stress and Destination Conflict***

Tourism is dependent on water resources for the following uses. Firstly, tourism consumes water through hotel operations, restaurants, and recreational activities. In mountainous destinations, ski, and golf tourism greatly rely on water supply for snowmaking and golf turf irrigation (Gossling et al., 2012). The increasing tourism visitation can place significant pressure on the water capacity at the destination. The tourism induced water stress, therefore, refers to the negative impact that tourism consumption and activities can influence on local water resources (Derman & Ferguson, 2003, Cole, 2012, Becken, 2014, Gossling, 2001, Gossling & Scott, 2012). Such direct stress includes the reduced ability of the locals to access water, failure to maintain water quality, and severe water scarcity during periods of drought. The water crisis at Zanzibar island, Tanzania, represented an example where the locals do not share the same right to water as the visitors (Tanzania Tourist Board, 2021). Gössling (2001) noted in his sustainable water use study in Zanzibar that the rapid tourism growth perpetuated a lowered groundwater table and deteriorated water quality. His study identified that the unsustainable level of water withdrawal by tourism primarily caused a negative water impact on the locals.

Moreover, many tourism destinations indirectly rely on water, such as environmental assets, including natural scenery (alpine lakes), bird viewing, or agricultural tourism activities. These environmental assets should serve as part of the stakeholders in the nexus of the tourism-water-community. Changes in the water resources may cause detrimental influences where the environmental scenery serves as the primary attraction to tourism. UNWTO (2005) listed destinations that are highly vulnerable to climate change and the loss of diverse bio-habitat. Water shortages were among the key concerns that would harm the tourism assets at the destination, with significant loss of tourism revenue and budget needed for recovery.

In the tourism and water stress studies, the tourism water footprint (TWF) has been scholarly adopted to assess the consumption of tourism water resources (Lee et al., 2021). Wang et al., (2007) summarized a top-down approach that uses the life cycle assessment to evaluate tourism-related water consumption. Alternatively, researchers applied WF measures from bottom-up by calculating and synthesizing individual tourism facilities together. Steen-Olsen et al. (2012) pointed out that the top-down approach is most appropriate for studies at global scale, while a bottom-up measure would be preferred at destination level. In addition to TWF, water scarcity

index (WSI), water stress index, and water quality indicators are among the top index that have been academically adopted in tourism studies (Yao et al., 2020)

### ***Scenario Analysis in Tourism Studies***

Scenario analysis is a novel approach in tourism research that takes various factors (“Drivers”, as referenced by Capistrano and Notorio (2021)) scholarly exploring possible future events. Outside of the tourism discipline, this approach has been widely deployed in climate change and environmental crisis studies. However, there has been a remarkable lack of scenario analysis applications to tourism research. Seyitoğlu & Costa (2022) conducted a systematic review and summarized 57 qualified pieces of literature between 2005 and 2021 with the scenario analysis approaches. They grouped these articles into (1) the internal complexity of tourism, such as the tourism workforce shift (Solnet et al., 2014), and (2) external uncertainties, such as climate change and environment shock at the destination (Orchiston, 2012). Since the tourism industry possess a complex structure including constellation of stakeholders (Bundy et al., 2017; Duan et al., 2021; Seyitoğlu & Costa, 2022), it is critical to identify factors under each stakeholder that can be utilized to measure condition under the current and future scenarios. Particularly, the scenario analysis under tourism research aims to recognize potential socio-economic and environmental risks to envision adaptive solutions for the destination (Seyitoğlu & Costa, 2021). Page et al. (2010) added that the scenario approach could conduct with a mixed approach, with usually more qualitative than quantitative assessment in the process.

## Methodology

Various scenario analysis has been adopted in tourism research using the work of Heijden et al. (2002) and Moriarty (2012) as the foundation. Yeoman et al. (2012) developed three scenarios and conducted a four-phase process to project New Zealand's tourism prospects. Because socio-economic and environmental factors usually form tourism scenarios, the first phase is to conduct a comprehensive content review using PRISMA protocol to explore factors to determine the scenario drivers (Capistrano & Notorio, 2021). 1134 literatures has been screened against title and abstract, followed up with 52 journal articles full text review. In the next phase, the study will construct measures to evaluate changes and subsequent impacts at each destination. These measurements will help extrapolate the forecasting during phase three and create comparative scenario outcomes among various scenario conditions and between the selected destinations. Due to the nature of scenario prediction, the study requires a validation process in the final phase. A concept triangulation will be applied by taking the current study findings against past applied scenario approaches and modeling. See proposed process in Figure 1.

### The Process of Scenario Analysis

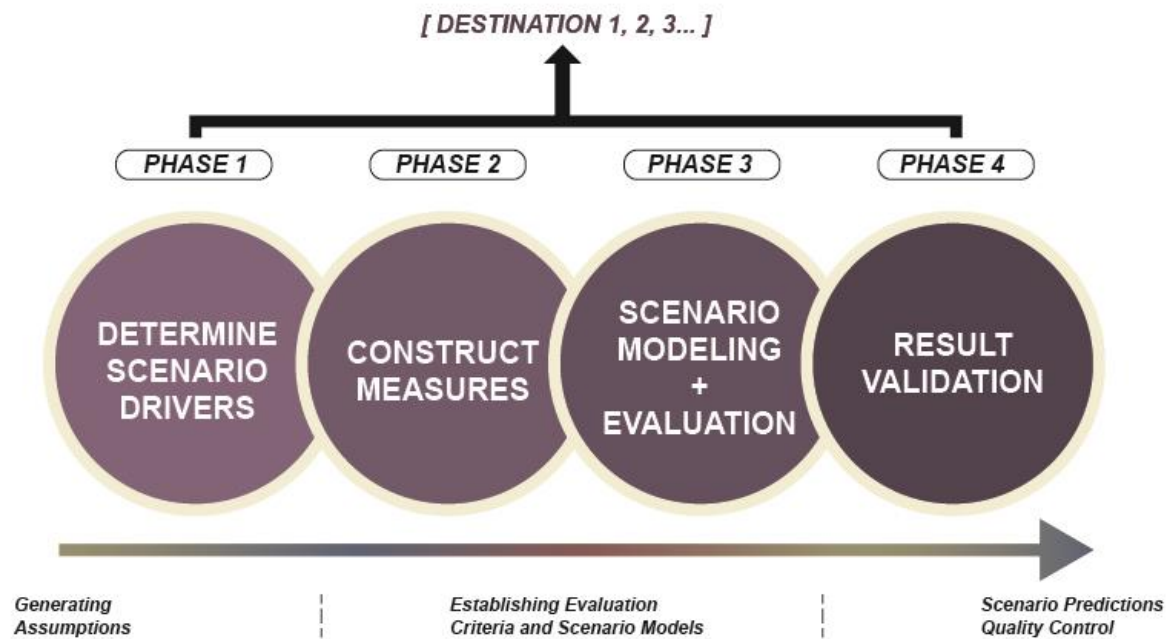


Figure 1. Proposed Scenario Analysis Process.

To examine the scenario implications to the nexus at each destination, this study developed an approach to first identify stakeholders under each broader factor and solicit inputs around the topic of tourism-induced water stress. The inputs include a mix of qualitative information collected from the human stakeholders and secondary data from the environmental stakeholders. Human stakeholder participants are recruited from a crowd-sourcing platform to achieve a large participant pool. In the next step, the researcher synthesizes these inputs in forming the drivers that serve as the basis for the scenario models. By reviewing performance measure literature, a series of water stress and human factor measures will be constructed in assessing each destination under the three scenario models: current water and climate condition, a moderate environmental shift, and an extreme environmental shift. Last but not least, outcomes from each scenario at each destination will be parallelly reviewed with past similar tourism environmental crisis studies. See figure 2 for the proposed research model.

**Proposed Research Model**

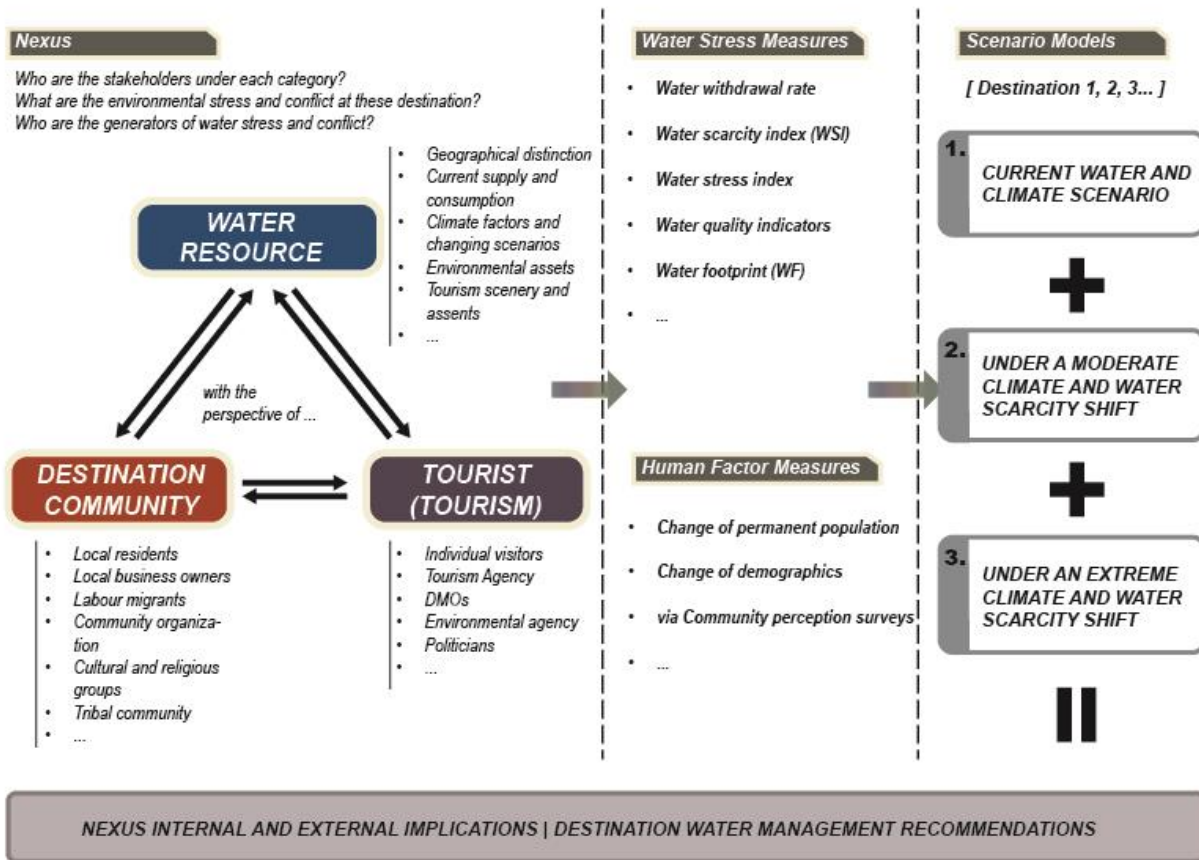


Figure 2. Proposed Research Model.

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