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# “Tourism, water, and gender”—An international review of an unexplored nexus

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**Abstract**

This international literature review of the tourism–water nexus identifies a gender gap. Tourism development can affect water supply both quantitatively and qualitatively. Many regions will face considerable problems of water availability and quality, affecting their tourism sector and increasing competition with local residents, and other industries especially agriculture. This international review of literature explores the tourism–water nexus, comparing and contrasting literature published in English, Chinese, and Spanish. Securing access to safe water for continued tourism development is a common theme and the vast majority of work has focused on hotels including water pricing, water-saving practices and innovative management methods. In all continents, struggles are apparent, and the unsustainability of tourism is having impacts on water quantity and quality. This article identifies significant gaps in the literature including climate change, the energy–water nexus, and the links with the Sustainable Development Goals. Furthermore, studies from a gendered perspective are minimal and the potential for areas of further gendered studies within the tourism–water nexus are highlighted including intersectionality, water insecurity and sanitation, tourism and gender based violence, and additional unpaid care work.

This article is categorized under:

Engineering Water > Planning Water

Human Water > Water Governance

Human Water > Rights to Water

**KEYWORDS**

water–tourism nexus, international review, gender

## 1 | INTRODUCTION

This article presents an international review of literature about tourism and water based on literature published in English, Chinese, and Spanish. It is a collaborative review using several databases including university libraries, Scopus, Google Scholar, and the China National Knowledge Infrastructure (CNKI). The CNKI is a national information project and is considered “the most comprehensive gateway of knowledge of China” (CNKI, 2019). In total 182 items are

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included in the review comprising peer-reviewed papers, book (chapters), postgraduate theses, and NGO reports. The international literature review was also interdisciplinary, reflecting the different approaches across the three languages. In English, the majority of articles appeared in the tourism literature, with the *Journal of Sustainable Tourism* publishing the most articles on the topic, and to a lesser extent in the environmental management literature. Articles in geography, anthropology, and sociology journals made up the majority of Spanish literature, while the Chinese literature was found in tourism studies, environmental management and environmental resources journals. The purpose of the review is to show that while there is increasing interest in the tourism-water nexus, and for good reason given it is such a water intensive industry, the literature has been from limited perspectives and almost never from a gendered angle. The majority of the studies have been about tourism/tourists needs and how to protect them at the expense of studies from the community's perspective, and have been very limited in their geographical foci.

It is well established that tourism development can affect water supply both quantitatively and qualitatively (Becken, Rajan, Moore, McLennan, & Garofano, 2014; Stonich, 1998). Water depletion, water pollution, and competition for water are some of the negative impacts that tourism brings (Becken, 2014; Bengé & Neef, 2018; Cole, 2012; LaVanchy, 2017; LaVanchy & Taylor, 2015; Noble et al., 2012; Strauß, 2011). Studies have shown that the per capita use of water by tourists far exceeds that of locals (Becken, 2014; Crase et al., 2010; de Stefano, 2004). Furthermore, the demand is likely to increase with increased tourist numbers, higher standard hotels, and tourist expectations for water dependent facilities such as pools, spas, golf courses and skiing; while availability in many places will decrease, due to climate change (Gössling & Peeters, 2015; Scott, Hall, & Gössling, 2019). Water is a key strategic risk for hotels (Gössling, 2015; Kim, Lindström, & Weinberg, 2013). Many regions will face considerable problems of water availability and quality, affecting the success, efficiency, and competitiveness of the tourism sector and increasing competition with local residents, and other industries especially agriculture.

The consumption of water in tourism is contextual, depending on climatic factors, seasonality of tourism, local norms, hotel size, design, and age. As Gössling et al. (2012) has suggested a focus at the destination level is required and consideration of changes in water quality and competing water uses, need to be taken into account. Overall, high-end and luxury tourism establishments tend to consume greater volumes of water per tourist than smaller guesthouses (Deng & Burnett, 2002; Gössling, 2001, 2015; Gössling, Hall, & Scott, 2015), and growth rates for these properties are significant. Furthermore, demand for new developments are growing fastest in developing economies, with over 12% growth rates predicted for Africa and Latin America (Hite & Rossmann, 2019). Furthermore, in the majority of countries where tourism is a significant water user, climate change is projected to exacerbate current water demand and scarcity problems (Gössling et al., 2012).

## 2 | ENGLISH LITERATURE

In a literature review on water use in the tourism sector, Hadjikakou, Chenoweth, and Miller (2012) conclude that “despite the fact that water use in the tourism sector may appear to be dwarfed by use in other sectors such as agriculture, when looking at average figures, the spatial and temporal concentration of water use by tourism implies that unsustainable use can still lead to severe depletion of local resources and conflict between tourist facilities, other industrial sectors, and local residents” (p. 433). English academic research on the link between tourism and the impact of water scarcity on destination populations initial focus was on Australia (Crase et al., 2010; Lehmann, 2009; Pigram, 2001) and the Mediterranean (de Stefano, 2004; Essex, Kent, & Newnham, 2004; Garcia & Servera, 2003; Kent, Newnham, & Essex, 2002; Rico-Amoros, Olcina-Cantos, & Sauri, 2009; Tortella & Tirado, 2011). Recent research in developing country contexts includes Honduras (Stonich, 1998), Zanzibar (Gössling, 2001), Bali (Cole, 2012, 2014), The Gambia and Dominican Republic (Page, Essex, Causesiv, Page, Essex, & Causevic, 2014), Morocco (Tekken & Kropp, 2015), and Nicaragua (LaVanchy, 2017). The literature divides into two broad themes: Sustainability and water management.

### 2.1 | Sustainability

The pre-requisite for tourism to be developed in a sustainable manner has been the lens for many of the studies. However, many studies reflect the prioritization of economic growth over environmental protection. While sustainability is stated in tourism development plans and policies, few criteria that adequately consider the limited capacities of water

resources or definitions of sustainable thresholds for water exploitation, policies or environmentally responsible measures, are actually implemented (Tekken & Kropp, 2015). Lack of regulation and weak water governance is a repeated theme in the literature (Alonso-Almeida, Robin, Pedroche, & Astorga, 2017; Cole, 2017; Cole & Browne, 2015; Cole & Ferguson, 2015; Dinarès & Saurí, 2015; Kasim, Gursay, Okumus, & Wong, 2014; Razumova, Rey-Maqueira, & Lozano, 2016; Tekken & Kropp, 2015; LaVanchy, Romano, & Taylor, 2017).

The unsustainable nature of tourism development in respect to water resources has been explored from a political ecology perspective by Stonich (1998), Cole (2012) and LaVanchy et al. (2017). This has highlighted “how environmental and political forces interact to affect social and environmental changes through the actions of various social actors at different scales” (Stonich, 1998, p. 28). As Swyngedouw (2009) has suggested the mobilization of water for different uses in different places is a conflict ridden process and “the political ecology approach traces the fundamentally socially produced character of inequitable hydro-social configurations” (Swyngedouw, 2009, p. 58). This is clearly the case where tourism development dominates, such as in Bali, Costa Rica, Honduras, and Nicaragua where there has been rapid and unchecked growth of tourism at the expense of the environment. Furthermore, a lack of governance resulting from a lack of law enforcement, overlapping mandates between government departments, and the deliberate misuse of terms to get around water laws was evident in Cole’s research in both Bali and Costa Rica (Cole, 2012; Cole & Ferguson, 2015). Commodification and privatization of the water supply when water is constrained is another common feature (Cole, 2017; Cole & Ferguson, 2015; Hof & Blázquez-Salom, 2015).

## 2.2 | Water management

The efficient management of water resources is key to ensuring the sustainability of tourism destinations and most studies on water management have been based on supply and demand management (Yoon, Sauri, & Rico, 2018). The soft-path paradigm as advocated by Brooks, Brandes, and Gurman (2009), that considers equitable access to sustainable water resources for the long-term economic and social prosperity, has received far less attention. Studies have either examined the possibilities of lowering demand and making the existing supply go further, using pricing, technology, and information programs to improve water-use efficiency; or building dams, pipelines, canals, wells, desalination systems, and so on to increase supply (Vila, Afsordegan, Agell, Sánchez, & Costa, 2018). As Yoon et al. (2018) discuss, desalination requires significant energy input, which depending on the source and availability, may displace water scarcity to energy scarcity. The energy needed for seawater desalination is approximately 8–10 times higher than that for production of fresh water from conventional sources (Voutchkov, 2018). Furthermore, desalinating water using non-renewable sources will add to pollution, greenhouse gas emissions and climate change. Meanwhile Gössling et al. (2015) suggests holistic water management for hotels should be an operational imperative and include consideration of food consumed, source of energy as well as water and if this has social or environmental implications.

There has been considerable discussion about water tariffs with some authors suggesting that water charges account for a relatively small share of overall hotel operational costs and that this is a barrier to water reduction (Charara, Cashman, Bonnell, & Gehr, 2011; Styles, Schoenberger, & Galvez-Martos, 2015). Other research suggests that where charges are higher, hotels are more likely to implement water-saving innovations (Razumova et al., 2016). However, Deyà-Tortella, Garcia, Nilsson, and Tirado’s (2017) analysis of water tariff reform in Calvià (Mallorca) revealed a very modest reduction in water consumption, and many tourist properties increased their consumption despite the higher prices. The authors concluded that the reform was not effective as a means to reduce the levels of water consumption for hotels in the Balearic Islands. Furthermore, we must consider how management approaches that treat water as a commodity are likely to reinforce disparities between those who can afford to pay for water compared with those who find water prices prohibitive. This is taken up by those who have discussed water and tourism through the lens of equity and human rights (Cole, 2014, 2017; Noble et al., 2012).

There is a body of literature that has considered water management and innovation in hotels, including certification programs (de Leaniz, Herrero Crespo, & Gómez López, 2018; Gabarda-Mallorquí, Garcia, & Ribas, 2017); tourist behavior (Bruns-Smith, Choy, Chong, & Verma, 2015; Gabarda-Mallorquí, Fraguell, & Ribas, 2018; Han & Hyun, 2018); water permit-trading schemes (Cashman & Moore, 2012); business strategies and Corporate Social Responsibility policies (Epler-Wood, 2017; Kasim, 2006; Kasim et al., 2014; Tekken & Kropp, 2015). Warren and Becken’s (2017) systematic literature review of 110 papers that explored energy and water saving research in tourist

accommodation identified that energy use is much better understood than water use and that considerably more research is required to identify savings opportunities for water. Some work has since been conducted, but has been limited to large hotels (Hocaoglu, 2017) and theoretical models (Atanasova et al., 2017; Pinto, Afonso, Santos, Pimentel-Rodrigues, & Rodrigues, 2017). While certification programs yield reductions in water use, especially in the first years of being certified, efficiency gains are outweighed by growth (Becken & McLennan, 2017). Furthermore, this is limited to larger hotels. Research from Malaysia (Kasim, Dzakiria, & Ahmad, 2017), and Indonesia (Cole & Browne, 2015) suggests larger hotels are more informed and responsive about innovative water management compared to their smaller and medium size counterparts. Smaller hotels apply less water management and innovation strategies either due to lack of awareness and understanding on the importance of innovative water management, and/or a lack of capital from marginal business returns. Lack of awareness is also apparent from tourists in terms of their water use impact on the local environment and community. Providing evidence from Zanzibar, The Gambia and Dominican Republic, Page et al. (2014) found that “although tourists recognize that they are likely to consume more water than locals in destination areas, there is substantial underestimation of this consumption” (p. 65). Significant research has taken place into encouraging guest behavior change for more efficient water use. Several studies suggest that the return on investment is made not only through saving on water consumption, but also by achieving indirect impacts by improving its business reputation (ITP, 2018a, 2018b; Santamarta Cerezal, García Rodríguez, & Ruiz Rosa, 2017). As Gabarda-Mallorquí et al. (2018) report, guests can contribute to reducing water consumption in the hotel industry first by choosing a hotel with a sustainable water management system and secondly by helping to save water during their stay. To maximize water efficiency, hotels “need to convey their environmental goals to their guests by informing them, empowering them, and actively engaging them in a shared objective” (Gabarda-Mallorquí et al., 2018, p. 12). For example, recent research by Gössling, Araña, and Aguiar-Quintana (2019) identifies the importance of comprehensive message designs that can increase towel reuse by 6.8% and bed linen reuse by 1.2%.

### 3 | SPANISH LITERATURE

Spanish analysis of the tourism–water nexus has also been very geographically limited. It has mainly concentrated on two countries: Spain and Costa Rica and, to a lesser extent, Mexico, Colombia, and Ecuador. The majority of articles have focused on the Spanish Mediterranean coast and the province of Guanacaste in Costa Rica. Both of these are areas where there has been high concentrations of tourist development, combined with the presence of residential tourism and associated services, such as golf courses. Thematically, the foci of attention have been: (a) how to manage access to safe water for continued tourism development and (b) how to understand socio-ecological conflicts derived from the tourism’s growth and its increased water demand. A further area of interest are studies related to the tourist potential of natural water attractions.

#### 3.1 | Water management

The majority of the Spanish literature explores the management of water supply for tourism, and how to minimize the impact of tourist water use. The focus is on the tourism industry needs and research has been to aid both private sector and public authorities to make decisions to guarantee the functioning of tourist activities. Analyses have also been set in the context of territorial transformation because of the increasing tourism development in some areas and the consequent new water demands (Hernández & Picón, 2013; Olcina & Sotelo, 2013).

Studies have included the analysis of water availability (Bengoechea, Rubert, & Fuentes, 1999; Gil & Rico, 2007; Valverde, 2013); the quality of available water (Cervantes-Martínez & Álvarez-Legorreta, 2015; Gómez-Cruz, Madrigal-Solís, Núñez-Solís, Calderón-Sánchez, & Jiménez-Gavilán, 2019; Herrera-Murillo et al., 2019); the study of its distribution and mechanisms of supply (Baños, Vera Rebollo, & Díez Santo, 2010; Gonz, 2012; González-Ramírez & Bejarano-Salazar, 2019; Rico, 2004; Rullán & Rodríguez, 1999; Valverde, 2013). There has also been interest in non-traditional methods to increase the availability of water, such as desalination plants (Morote, Hernández, & Rico, 2018) or water reuse and wastewater treatment (Olcina and Moltó, 2010).

A number of studies have explored how tourist developments can manage their water use. These investigations have considered the tourists uses of water (Gil Olcina, 1993; Gil & Rico, 2007; Hernández, 2006; Massa-Sánchez,

Arteaga-Marín, Viñán-Merecí, & Martínez-Fernández, 2018) and their consumption (García, García González, 2004; Morote, 2016; Rico, 2007; Torres & Vera-Rebollo, 1999). In a similar vein to the English literature, analyses have explored a range of water management techniques mainly focused on larger hotels (Gabarda Mallorquí, Ribas Palom, & Daunis-i-Estadella, 2015; Barriga, 2017; Rodríguez & Gelabert, 2006; Vera Rebollo, 2006), including water-saving practices and innovative management methods (Escalera Izquierdo, Pérez Zabaleta, & Vizcaíno Pérez, 2014; Gómez & Tejeida, 2008; Olcina, Saurí, & Vera-Rebollo, 2016). However, the Spanish literature also included studies on water management in small and medium sized accommodation (Padullés, Iauspas, & Ribas, 2016) and golf courses (Espejo & Cànoves, 2011; Sanz-Magallón, 2005). Some planning studies have explored how spatial planning processes could integrate tourist use of water with other demands (Morote, 2015; Rico & Hernández, 2008).

### 3.2 | Socio-ecological conflicts

The other major focus in the literature on water and tourism published in Spanish has been the impacts of tourism development on community water supplies, such as it has occurred in the dry tropical climate of Guanacaste, Costa Rica (Hernández & Picón, 2013) and in the arid environment of Los Cabos, in Baja California Sur, Mexico (Graciano, 2018). In Guanacaste, this increased tourism water footprint has jeopardized the water needs of the local population. Moreover, the growth in tourism construction has lacked enough control and planning leading to contaminated aquifers due to salinization, and shortages for both the local population and the tourist developments (Picón & Baltodano, 2006).

In Guanacaste, tourism's threat to local water resources has resulted in intense socio-ecological conflict for more than 20 years (Hernández & Picón, 2011; Honey, Vargas, & Durham, 2010; Ramírez, 2008). The dispossession of water that has favored the demands of the tourism industry over the daily needs of the local population are seen as the cause of the socio-ecological conflicts (Blanco, 2017; Cañada & Gascón, 2016). The main conflicts relate to:

- 1 Opposition to the extraction of water from aquifers and the construction of infrastructure to channel water to serve tourism and real estate developments in the areas closest to the sea. Among these conflicts, the case of Sardinal de Carrillo stands out, where in 2007 the local population managed to paralyze the construction of an aqueduct for more than 10 years (Fernández, 2009; Navas, 2015; Navas & Cuvi, 2015; Silva, 2016; Silva, 2019). Sardinal became an emblematic community for its tough resistance until 2019, when the Costa Rican State managed to inaugurate the infrastructure, in an attempt to reactivate the tourism-residential investment cycle.
- 2 Resistance to state attempts to change methods of water management. To overcome the problems of shortages and ensure supplies to tourism developments, the State wanted to take control of community water-management structures. Fearing depletion of their aquifers has strengthened the community's struggle to maintain community-based forms of management, as in the Potrero community case (Bolaños, 2016, 2019).
- 3 Control requirements for the irregular discharge of wastewater by the hotel and residential developments to the sea, rivers, landfills, or even on secondary roads, which by infiltration, have contaminated some aquifers, as has happened in Playa Hermosa (Cañada, 2019; Hernández & Picón, 2011).

Some solutions to the water conflicts in Guanacaste have been put forward including: (a) Limiting the growth of tourism; (b) More reliable aquifer capacity studies to inform future development plans; (c) Ensuring local communities access to safe, sufficient drinking water (Herrera-Murillo et al., 2019); and (d) Developing a more inclusive form of tourism with greater benefits for local communities (Cañada, 2019).

In other contexts, analyses of the conflicts from the increase in the demand for water for tourist uses and its potential competition with the needs of the local population have also been carried out, for example, in Toluca, Mexico (Pérez-Ramírez, Zizumbo-Villarreal, & Monterroso Salvatierra, 2009), or Alt Empordà, Catalonia, Spain (Ventura, Ribas, & Saurí, 2000). However, no territory like Guanacaste systematically concentrates studies on the relationship between the increase in demand for tourism use and socio-ecological conflicts. Hernández, Zizumbo Villarreal, and Torregrosa Martí (2017) investigation in Benidorm, Spain stands alone in the Spanish literature in taking a political economy perspective. The analysis looks at how private concessions have been used to guarantee the supply of water in tourist areas as a mechanism of accumulation and reproduction of capital.



## 4 | CHINESE LITERATURE

There is a growing body of Chinese literature discussing water and tourism in China; however, most of it lacks both depth and breadth. Unfortunately, water resource management and related measurements are slower than tourism development and as a result, the management of the water supply, wastewater, forest fire prevention and irrigation are all being challenged (Wang, Wu, Deng, & Yang, 2015). Most studies centered on areas of water scarcity, ecological weakness, and the mismatch of season between rainfall and tourism visits (Duan & Na, 2018; Ju & Wang, 2017; J. Wang & Zhou, 2015). Overall, a disparity in water supply and demand constrains sustainable tourism development for many places in China (Xu, 2019). The tourism–water nexus literature falls into four main themes.

### 4.1 | Water as a tourism resource

Water is regarded as a resource for the development of attractions and destinations in China. The cases of Maozhi River eco-tourism district (Ju & Wang, 2017) and Suzhou Lake Tai tourism resort (J. Liu, 2016) in China reveal that tourism benefits simply from its close proximity to water, which, when integrated with local historical and cultural factors, together, contribute to the leisure tourism experience. To reduce the pressure that tourism exerts on the quality and quantity of water and improve water management, Lin (2015) suggests that in terms of building new tourism-oriented districts, the water environment should be foundational to planning.

### 4.2 | Water security

With increasing environmental awareness, researchers have more recently focused on water resource security in tourism, environmental protection, the carrying capacity of water for tourism, and tourism's water footprint. Research on this topic did not start until the late 1980s (Q. Wang, Yang, & Zhang, 2010). The majority of this research concentrates on the demand side, and has identified multiple types of demand, including accommodation, restaurants, resorts maintenance, and water leisure activities; and that high demand affects water security. However, at the current stage, studies on tourism water security are mostly qualitative, descriptive and superficial; few have empirically investigated this topic. Wu and Wang (2016) indicated that research on tourism-water security management in China needs to be strengthened. Most of the managerial proposals are “slogan-style” suggestions and offer little advice on effective implementation.

In terms of approaches to improve water security and resources management, many scholars in China advocate the use of all forms of propaganda to vigorously promote water conservation guidelines, policies, regulations and knowledge (Wu & Wang, 2016; Xu, 2019). For instance, this includes creating “role models/model households” in leading innovative ideas (Duan & Na, 2018). “Role models” are advocated by the Ministry of Ecology and Environment together with Ministry of Culture and Tourism who formulated the regulations on the management of “National ecotourism demonstration zones (国家生态旅游示范区)” in 2012. Improving water-saving public awareness as a “soft approach” has been identified frequently by scholars (Qiu, 2016; Q. Wang et al., 2010), and through these approaches, tourists and tourism operators would be encouraged to save water. Furthermore, H. Liu et al. (2019) suggest the media should report on people's positive water-saving behavior.

### 4.3 | Water management

In Chinese literature, case study research explores water demand management including allocation, utilization and planning. To date, most of the research has focused on water supply and demand in urban areas (Xu, 2019), where “water quota management” has now become the core strategy and governance model for managing water demand (Jiang, Chen, Younos, Huang, & He, 2010). China's urban water quota management is an integrated management system, led by the central and local governments, with participation from the public and industrial sectors. Given the limited water resources, and that more than 400 out of 660 cities in China are facing water shortages, the system controls water demand, “using a water quota index system that provides the necessary legal, administrative, economic, and technological framework for carrying out the rational allocation and effective control of water resources” (Jiang et al., 2010,

p. 468). For instance, star rated hotels are one of the most water-consuming industries in Chinese cities (Li, 2018) and many have applied quota management to their water use (Wu, Zhang, Wang, Zhang, & Li, 2008; Zhu, 2010). A research team surveyed 349 hotels in Beijing over a 10-year period (2005–2015), and found that implementing water quota management made a significant contribution to the efficient use of water, and that the total quantity of water consumption is effectively controlled (H. Liu et al., 2019). Similar effects were found in Tianjin (Wang, Liu, Sun, & Li, 2015). Additionally, useful approaches to improve water usage that were identified in the study including the promotion of water-saving appliances, refined water management and making full use of unconventional water sources such as recycled water for gardens, and rainwater collection. How much of this was learnt from studies overseas was not identified.

#### 4.4 | Tourism's impacts on water environments

Fourthly, scholars have discussed the impact of tourism on water environments, of which the majority have discussed the negative effects of tourism on water quality (Xu, 2019). Ning and He's (2007) study in Lijiang suggests the model of water usage in the World Heritage Site is unsustainable. Guan, Li, and Liu's (2009) study, in the same town, confers and advocates protecting the water resource environment. Tourist activities and tourism operations negatively affect freshwater bodies such as rivers and lakes. The lack of appropriate planning and under-equipped sewage processing devices cause reduced water quality (Xu, 2019). Many restaurants and hotels are located near lakes and rivers and wastewater is simply discarded into the fresh water bodies (Xu, 2019). A study on the impacts of tourism activities on Poyanghu National Wetland Park found that water quality decreased and eutrophication emerged, but research on wetland tourist destinations in China needs longitudinal investigation (W. Li, 2015).

Research in rural tourism destinations has identified two major causes of water quality, quantity, and overall environmental decline (Y. Li, 2016): First, the over-development of tourism; and second, in areas reliant on underground water sources for daily life, the ground water level is being reduced and water pollution can be seen. An empirical study on the "herdsman's home" discussed the importance of managing water resources in the development of tourism (Duan & Na, 2018). The study focused on yurt experience providers in the pasture area of eastern Inner Mongolia Autonomous Region. Problems uncovered included limited ways of accessing and extracting water, poor water quality, outdated storage systems and inconvenient logistics. To alleviate the problems, the authors proposed the construction of centralized water intakes and sewage facilities by local government-employed technicians, instead of relying on independent and individual household drilling. However, the construction could spoil the local aesthetic appeal and would be expensive. In mountain-oriented attractions, when the peak tourist season and the mountain dry season overlap, the destination water environment is challenged and the cost of water supply becomes a pressure for the attraction (Xu, 2019).

## 5 | COMMONALITIES IN THE THREE BODIES OF LITERATURE

While there have been differences in the approaches and topics in the three bodies of literature, there are also commonalities across them. It should also be noted that some Spanish and Chinese authors publish both in Spanish/Chinese and English. While others prefer to publish in English. For example, Dinarès and Saurí (2015) have published about water consumption patterns of hotels in response to the 2007–2008 drought in Barcelona in English but not in Spanish. While Li (2018) has published a life cycle footprint analysis of tourism-related direct and indirect water consumption in Jin-Jing-Ji, Beijing in English and not in Chinese. In all three languages, we see that securing water for the tourism industry is a common theme and that the majority of work has been around hotels use of water rather than other aspects of tourist water use; although case studies around different tourist destinations are more common in the Chinese literature. The majority of the studies have taken a tourism first stance, and when water security for the hotel industry is threatened, investigations into how to manage their water supply have followed. Far fewer studies have been from the community's perspectives but in all continents, struggles are prevalent, and the unsustainability of tourism and its impacts on water quantity and quality are apparent. Water quality has received less attention than water availability while increased salt-water intrusion, due to excessive use of coastal ground water, is a quantity and quality issue.

Climate change has been surprisingly absent from the majority of studies given tourism water conflicts are frequently in coastal areas, that will suffer from sea level rise and increased salt water intrusion. In the last few years, climate change adaptation for hotels with reference to water has received some consideration (Olcina, 2012, 2019; Olcina

et al., 2016; Olcina & Vera-Rebollo, 2016). As Becken and McLennan (2017) suggest the water-energy nexus is critical to solving multiple resource challenges simultaneously, but has rarely been considered in tourism. This is especially the case for destinations that rely on desalination for their water supply, for example, Sharm el-Sheikh, Egypt (Jussah, Orabi, Sušnik, Bichai, & Zevenbergen, 2018), and Benidorm, Spain (Yoon et al., 2018).

Also absent from these studies is consideration of the Sustainable Development Goals. There has been an almost total absence of papers dedicated to the topic of SDG 6 (Clean water and sanitation) in relation to tourism. With the exception of Cole's work: Cole, 2017; Cole & Ferguson, 2015; Cole & Tulis, 2016, there has also been a very limited number of papers that have considered gender as part of the water-tourism nexus. We dedicate the next section to a brief overview of that topic area before exploring potential areas for future studies.

## 6 | THE NEGLECT OF GENDER IN WATER AND TOURISM STUDIES

In the Chinese literature, there were no papers found that took a gendered perspective of the water and tourism nexus. In the Spanish analysis of water conflicts, especially in the province of Guanacaste, studies highlighted the role women played. In the cases of Sardinal (Navas & Cuvi, 2015; Silva, 2016; Silva, 2019) and Potrero (Bolaños, 2016, 2019), women were at the forefront of the community defense against tourism investors over-exploiting their water sources. As these authors, and Cole and Ferguson (2015), discuss, both men and women in Costa Rica consistently perceive water as a women's issue. Women's responsibility for household water is driving them to organize, protest and shape community activism. Similarly, in Colombia, the processes of water privatization, associated with tourism development, has primarily affected rural women (Ojeda, 2011; Ojeda, 2016; Ojeda, Petzl, Quiroga, Rodríguez, & Rojas, 2015). Whereas in Mexico, by contesting normative gender roles and becoming local professionals and environmental stewards, women play a significant role in environmental conservation (Hanson, 2016).

The virtual absence of gender as a theme in the tourism and water nexus is particularly surprising given that there has been a considerable body of work on water justice and gender (Ahlers & Zwartveen, 2009; O'Reilly, Halvorson, Sultana, & Laurie, 2009; Sultana, 2011; Truelove, 2011), including an edited volume from political ecology perspectives (Buechler & Hanson, 2015). Even more so when we consider that globally, women and girls are responsible for water collection and management in 80% of households (UN Women, 2018) and that they suffer to a greater extent when water resources are mismanaged (Hemingway, 2004). Women face greater health and safety risks when water and sanitation systems are compromised by climate-induced drought (UN Women, 2017). A significant body of literature explores climate change and water, and how the vulnerabilities of marginalized groups will increase, and affect gender and social relations (Buechler, 2009; Sultana, 2014; Rao et al., 2019). Climate-induced ecological change will alter drinking water availability, reliability, quality, quantity, and accessibility. This will increase the distances women have to walk in search of clean water, exacerbate difficulties in health, for example, from waterborne diseases, and sanitation. It will add to women's strains as caregivers and lead to increased psychological and social implications. Karim, Emmelin, Resurreccion, and Wamala (2012) also suggest that one of the impacts of household water scarcity is increased gender based violence. However, none of the climate change and gender studies considers tourism a factor. In Chinese there are a handful of articles that discuss gender and climate change in China (Ai, Wang, Lv, & Zhao, 2018; Xiao, 2019; Yin, 2014), including from the perspectives of rural women (Hu, 2010); but few have singled out water issues and none have taken tourism into account. In Spanish, studies have explored climate change and tourism but not gender or water (Santos-Lacueva & Saladié, 2016); or climate change and gender but not water or tourism (e.g., Lugo-Morin, Caicedo, Torres-Cuapa, Andrade, & Cruz, 2014). Studies that have examined tourism, climate change and water in both Spanish and English (Gössling, Hall, Peeters, & Scott, 2010; Hoogendoorn & Fitchett, 2018; Kaján & Saarinen, 2013; Michailidou, Vlachokostas, & Moussiopoulos, 2016; Osorio, Reyes, & Hernández, 2014), like other tourism and water studies, mostly take an industry perspective. Even those that discuss adaptation challenges, and dimensions of vulnerability, do not consider the gendered dimensions.

While the World Tourism Organization claims, "tourism can play a critical role in achieving water access and security, as well as hygiene and sanitation for all." (UNWTO, 2015), there has been no analysis of how this can be achieved. While the studies identified above point to irresponsible disposal of waste (and its harm to tourist attractions/ tourists' supply), there has been no studies on tourism, gender and sanitation, despite the links. Sustainable Development Goal 5 (gender equality) and Sustainable Development Goal 6 (clean water and sanitation) are strongly linked (Alarcón & Cole, 2019; Sweetman & Medland, 2017) and their integration is essential (Leahy et al., 2017). Tourism could have a real impact on SDG 6. Infrastructure improvements including the supply of improved water and sanitation is a well-



documented positive impact of tourism (Wall & Mathieson, 2006). Addressing the gender imbalances that drive inequitable water allocation and distribution, requires strengthening women's voice in the access to, and control over, water supplies, administration, pricing and use, and thus their participation in water management and decision-making. While this need has been discussed in other bodies of literature (Buechler & Hanson, 2015; Carmi, Alsayegh, & Zoubi, 2019; Sweetman & Medland, 2017), it is noticeable by its absence in the water and tourism literature.

## 7 | CONCLUSIONS AND SUGGESTIONS FOR FURTHER WORK

This international review of the water-tourism nexus across the world's three major languages has shown an increasing number of articles published that explore this important topic. However, these are still limited in scope, both by geographic region and by topic. Common to all three languages is competition between tourism and other water users. Most studies have concentrated on securing water for the tourism industry through water management, particularly in hotels, and within this, the focus has been on reducing demand, with varying degree of success. The Chinese "water quota management" that tightly regulates water use is reportedly effective. The increasing scarcity of water and increasing demand from tourism has led to conflict, as reflected in the studies from political ecology and political economy perspectives. The communities' lack of power has been central to these studies, and in Costa Rica the prominence of women as activists notable.

Evidenced within the review were significant gaps in the literature: While problems with sewage disposal were reported, there have been no studies that have considered tourism and sanitation per se. Furthermore, despite the increasing importance of climate change, the studies thus far are about how the tourism industry can adapt and mitigate but studies that explore tourism, water and climate change from the communities' perspective, or that take a gendered perspective, are yet to emerge.

The most significant gap in the literature identified, and the hunch that provided the basis for this review, is was the discernible lack of literature that takes a gendered view on the water and tourism nexus. Given the overwhelming evidence of the relationship between gender and water, this gap is palpable. We suggest that there are four areas in particular that are in need of further study:

First, an exploration of tourism and SDG 6, including its interconnection with SDG 5. This needs to go beyond exploring water scarcity to an analysis of tourism and sanitation. Furthermore, the interconnection with SDG 13 is critical, given the propensity for tourism to be situated on vulnerable coasts. Second, further exploration on the intersectionality of women's experiences on the water-tourism nexus since their experiences were not monolithic, but intersect with other categories of identity such as nationality, ethnicity, life-stage and occupation (Cole, 2017). Third, further research into the additional unpaid care work that falls on women when they compete for water supplies with the tourism industry, and fourth, further exploration on water insecurity and gender based violence generally and in relation to tourism specifically.

Geographic areas for further research include areas where tourism is developing rapidly without adequate planning such as Mexico and the Dominican Republic; and in water scarce areas with very high concentrations of tourists due to UNESCO World Heritage Site status such as the Beijing-Tianjin-Hebei regional cluster. Furthermore, destinations with extremely high water stress according to ITP Destination Water Risk Index (ITP, 2018a, 2018b), such as Cape Town, South Africa, Bangkok and Pattaya in Thailand, and Cairo in Egypt all need further analysis.

The studies identified require both quantitative household level data and the women's stories to gain a deep appreciation of the gendered nature of the tourism-water nexus. All the above studies together could provide the multi-dimensional impact of tourism water use on local communities and the wider impact on gender relations, which together with information of the impacts of tourists water use on ecosystems is required for a fuller understanding of the tourism-water nexus.

### CONFLICT OF INTEREST

The authors have declared no conflicts of interest for this article.

### AUTHOR CONTRIBUTIONS

**Stroma Cole:** Writing-original draft. **Ernest Canada:** Writing-original draft. **Yue Ma:** Writing-original draft. **Yesaya Sandang:** Writing-original draft.

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