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**WATER MANAGEMENT IN TOURISM**

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**ABSTRACT**

Environmental studies in tourism have highlighted importance of natural resource conservation for future. Water, being a precious resource requires effective control and measuring tools for well being of travel and tourism. This study reviews the literature of water usage in different tourism activities. The findings based on analysis of secondary data reveal that there is a need of strategic planning for reduction in water use and its recycling.

**Keywords:** Tourism, Water Consumptions, Reduction, Management, Sustainability.

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**Introduction**

Over 450 million people on our planet are living under water stress ((Vörösmarty, Green, Salisbury, & Lammers, 2000) and water use is increasing continuously. Its use has tripled in last fifty years (Carbon Disclosure Project, 2010a). Travel and tourism industry consumes water in its different activities and uses 1% of total global water consumption. Trends indicate a strong growth in its demand but our water resources are declining because of depletion of fossil water resources (glacial ice and ground water, droughts, increase in evaporation, changed patterns of run-off and global warming with reduced precipitation levels) (IPCC, 2007; Parry et al., 2009a; Parry et al., 2009b). A description of water use in different tourism activities is absent in literature. This paper is a modest effort to discuss this gap and to suggest effective water management strategies for various activities of travel and tourism industry.

Recreational and other activities of our industry like diving, fishing, kayaking, canoeing, swimming and sailing takes place in water bodies and are important elements of tourism products (Gössling, 2006; Hall & Härkönen, 2006; Prideaux & Cooper, 2009). Spas, swimming pool and wellness areas use considerable amount of water. Other activities like landscaping of hotels, resorts and attractions, maintenance of gardens, infrastructure and super-structure development and food production also need considerable amount of water (Chapagain & Hoekstra, 2008; Gössling, 2001; Hoekstra & Hung, 2002; Pigram, 1995; Worldwatch Institute, 2004). However, for travel and tourism industry, there is lack of statistics related to water use for a nation or for a specific region. Water utility concept in literature of this industry is available in two different dimensions i.e. direct water use (tourism activities and accommodation facilities) and indirect water-use (infrastructure, road etc.).

**Water use in tourism**

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This section of paper deals with water utility in different activities and sectors of travel and tourism industry.

### **Accommodation**

Average international tourist consumes 222 liters water per day (Gössling, 2005) and its volume vary with hotel standard. High standard accommodation units consume more volume of water (Bohdanowicz and Martinac 2007). Other factors like geographic location, hotel structure and comfort level also affects water utility. Smith, Hargroves, Desha, and Stasinopoulos (2009) stated that in Australia, major areas of water usage were guestrooms (42%), kitchen (16%), laundry (15%), toilets (12%), cooling (10%), irrigation (3%) and swimming pools (2%) while hotels located in USA indicated that kitchen and public area of hotel consumes maximum percentage of total water used while guest showers, toilets, laundry and others use comparatively less quantity of water (O'Neill, Siegelbaum, & the RICE Group, 2002). In Turkey, 30% of total water consumption is in kitchen and laundry followed by pools (20-25%), guest rooms (12%) (Antakyali, Krampe, & Steinmetz, 2008).

### **Food**

UNESCO (2009) reports indicate that 40-2000 L and 1000 to 20000 L. of water is used for production of 1 Kg of wheat and one Kg. of meat respectively. On an average, 2000-5000 L. water is used for per day diet of a person. Water use at such a big level creates problem for those tourist-appealing islands, which are already facing the problems of potable water (Gössling Garrod, Aall, Hille, & Peeters, 2011). The volume of water usage depends upon standard of hotel, distance from origin to destination, type and food consumed by tourists also.

### **Tourism Activities**

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Various activities like golf and skiing where artificial snow (snow making process) is prepared consume considerable water volume. This also varies with climate, soil and size of golf course (Baillon & Ceron, 1991; Ceron & Kovacs, 1993; Throssell, Lyman, Johnson, Stacey, & Brown, 2009). Van der Meulen and Salman (1996) stated that approximately one million M3 of fresh water is used annually for a single 18-hole golf course located in Mediterranean sand dune areas. In France (2007), 19 million M3 water was used for snow-making and 70% of this water went as runoff (Badré, Prime, & Ribière, 2009). The same activity consumed 60 million M3 water in USA in 2004/05 (Scott et al., 2011). Other activities like infrastructure development for events, contentions and attractions increase the demand of water (e.g. Meyer & Chaffee, 1997; Sebake & Gibberd, 2008; Zaizen, Urakawa, Mutsumoto, & Takai, 2000).

### **Fuel Use**

Water and energy use are interlinked as water is consumed for production of energy (e.g. hydropower, thermoelectric cooling, minerals extraction and mining, emission controls fuel production) and energy is used for water production (treatment, transport, pumping and desalination). Transport and other facilities require energy and thus consume water (Worldwatch Institute (2004). This report indicates that one L. of gasoline is produced by use of 18 L of water. Average single passenger in 100 Kms. air travelling consumes 4.1 L. fuel which showed that a return trip of 03 7600 Km for average passenger is a consumption of 5600 liter of water (UNWTO-UNEP-WMO 2008). Trend of sustainable fuel is also addition in water use. One liter of bio-fuel production consumes 2500 liters of water. But these bio-fuels accounts only 3% of total fuel used in European countries (UNESCO, 2009) till date and future usage of water for the same can be anticipated well.

### **Water Management for Tourism**

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Required water volume, geographical conditions, treatment of wastewater and sewage decides the fate of water resource for future. Water capacity investigation and water auditing at local regional or national level is needed to understand the present and future status and use of water for sustainable growth (Bohdanowicz & Martinac, 2007; O'Neill, Siegelbaum, & the RICE Group 2002; Cooley et al., 2007). Auditing can describe category wise (industry wise) water consumption and can suggest plan for its use. Even the destinations with shortage of water do not have relevant information related to water inventory (Eurostats, 2009). There is a need to identify a suitable water strategy based on climate changes and locational geographical conditions for each destinations and to implement it (Kent, Newnham, & Essex, 2002; Essex, Kent, & Newnham, 2004). These strategies can compel all stakeholders of tourism to re-consider the plans of water usage in their organizations. Policy formulization (European Water Framework Directive (European Union, 2000) can support these conservative efforts. Literature suggests demand and supply side management strategies for water management (Bates et al., 2008) but this paper discusses only demand side management. Almost all activities of tourism, uses water and have potential to save it. By using effective equipments, hotels can decrease water consumption by 30% in case of indoor activities (Cooley et al. (2007) and same opportunity is available for outdoor activities. O'Neill, Siegelbaum and the RICE Group (2002) also indicated that average hotel could reduce water consumption by 10% to 20% by using appropriate strategies. Following water management strategies can be used for different amenities and activities.

### **Guest Room**

Showerheads, toilets and other amenities available for tourist can save water by using effective management strategies. A significant level of reduction in water can be obtained by

using reduced flush and dry composting toilets (Carmody, 2007; Kavanagh, 2002; Thompson, 2008). In flush toilets and urinals, recycled water can be used. Low floor showerheads can provide extra support to conserve.

### **Pools**

Pools in hotels are also known for water consumption at large scale. Management for control should ensure to avoid large sized pool. Artificial waterfall, fountains and others amenities and establishments for entertainment and recreation should be designed to reduce water evaporation. Pool might covers for reduction of evaporations in hot climates and drainage barriers can reduce water use (Smith et al., 2009). Gössling et al. (2011), O'Neill & Siegelbaum and the RICE Group (2002), Smith et al. (2009), and Cooley et al. (2007) have investigated these issues in depth and recommended detailed guidelines for pools management.

### **Gardens**

By installing meters to measure water use, planting drought resistant variety of plants and grass, reducing water evaporation, using drip irrigation system equipped with electronic moisture sensors and grey water or rainwater use for irrigation can reduce the required volume of water for hotel or any other attractions. Smith et al. (2009) have stated that landscaping in hotels can conserve 40-50% water by using modern and effective strategies.

### **Kitchen**

In kitchen, water is used for preparation of food and cleaning the dishes. A change in cooking style, use of boilers that consumes less fuel, use of efficient dishwashers and reduced flow with control on regulators for both basins and sinks can reduce the water use significantly (Smith et al. 2009).

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**Activities**

Minimizing water use for soil moisture can be supportive in reduction of water use (Rodriguez Diaz et al., 2007). Reduction in frequency of irrigation (Balogh & Walker, 1992), changing of turf species which demands less water (Ceron & Kovacs, 1993) and using grey or treated water (Ceron,1990; Hawtree,1983) for irrigation reduces the usage of water drastically.

**Conclusions**

Literature survey for water management in tourism discipline has room for investigations. Using water, based on sustainable approaches is economic for investors. More investments in water conservation management and sustainable technologies can play protective role for future of human efforts and industries like travel and tourism. Based on detailed analysis of literature, a need of strong ‘water management policy’ was felt. In this way, the article successfully made justification with its objectives.

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