

TRABAJO FIN DE MÁSTER
Máster en Dirección y Planificación del Turismo

**Hotel water consumption on island destinations: the
case of Puerto de la Cruz**

**Consumo de agua en el sector hotelero en destinos insulares: el caso de
Puerto de La Cruz**

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Abstract

Tourism alongside with its contribution to economic and social development may have negative impacts on local resources, including water, which is especially relevant in island destinations and areas of water scarcity. This study focuses on water consumption and management of the hotel sector, taking as case study Puerto de la Cruz – one of the most touristic areas in the Canary Islands. To achieve this objective two methods are used: a 45-item questionnaire and qualitative interviews with managers of the hotels. The results reveal that there are several factors which affect water use in hotel sector. Among them can be highlighted the adoption of water saving measures and the lack of awareness about the importance of the water problem. The current study is the first step of a more global study of water use and water management in tourism sector in Tenerife, which started in November, 2017.

Keywords: water management, water use, tourism, hotels, Tenerife.

Resumen

El turismo, junto con su contribución al desarrollo económico y social, puede tener impactos negativos en los recursos locales, incluida el agua, lo cual es especialmente relevante en los destinos insulares y las zonas de escasez de la misma. Este estudio se centra en investigar qué variables determinan el consumo de agua y la gestión de la misma en el sector hotelero, tomado como caso de estudio Puerto de la Cruz, una de las zonas más turísticas de las Islas Canarias. Para lograr este objetivo se utilizan dos métodos: un cuestionario de 45 ítems y entrevistas cualitativas con los gerentes y los managers de los hoteles. Los resultados revelan que hay varios factores que afectan al uso del agua en el sector hotelero. Entre ellos se puede destacar la adopción de medidas de ahorro de agua y la falta de conciencia sobre la importancia del problema del agua. El presente estudio es el primer paso de un estudio más global sobre el uso del agua y la gestión del agua en el sector turístico en Tenerife, que ha comenzado en noviembre de 2017.

Palabras clave: gestión del agua, uso del agua, turismo, hoteles, Tenerife.

Introduction

The European Commission (2010) considers tourism as one of the main driving forces of economic growth in several regions of the world as it helps to achieve a high level of employment and social welfare, sustainable growth, a better quality of life as well as greater economic and social cohesion.

The water problem has been gaining importance in the world political agenda in recent years. But despite the fact that water is an issue of global importance, as it proves its pre-eminence in the Sustainable Development Goals from the United Nations, the impact of tourism activities on local water resources remains an area scarcely studied and often overlooked in the fields of environmental management and sustainable tourism.

As an important sub-sector of the tourism industry, the hotel sector, uses much more water than the general population. Singh and Clouden, 1999, analysed the case of Barbados and found hotels' consumption to be 756 versus 240 l / cap-d. The use of resources has not been a priority in most operations of the hotel sector unless efficiency savings could provide a rapid return on investment without compromising customer comfort and satisfaction.

According to the World Tourism Organization (2017), Spain is the second European destination behind France, absorbing almost 10% of international tourists visiting Europe. Thus, it is essential to promote the study and analysis of the tourism activity trend in order to guarantee its sustainable development. It is also important to focus on the potential serious environmental impacts, especially in relation to water resources. In Spain, the tourism areas, mostly coastal, coincide with those of the greatest problems of quantity and quality in water supplies. The situation can be also aggravated by geographical conditions in the case of island territories. At that extend, the Canary Islands is a combination of narrow geographic spaces of water scarcity and great tourist demands.

The Canary Islands are ranked third by number of foreign tourists received in the Spanish tourism market (Ministerio de Energía, Turismo y Agenda Digital, 2016). Among the distinctive characteristics of the Canary Islands, as a tourist destination, the absence of seasonality should be highlighted, given that it has a mild climate throughout the year.

The above-mentioned scarcity of water resources, which characterises the Canary Islands and is common within island territories, determines the necessity of an efficient management of tourism activities which could have a positive effect on the greater availability of water and the improvement of environment quality in general. The archipelago includes seven islands with very different characteristics and, therefore, with different problems. Our study is focused on the tourism sector of

the municipality of Puerto de la Cruz - in the northern part of the largest and most populated island of the Canary Islands - Tenerife.

There are few studies on the use of water in the tourism sector (with special attention to the hotel sector), although in recent years research has emerged on the demand for tourism water, in particular the analysis of factors influencing the different uses of water by this sector. However, there is still a deficit in the analysis about the tourism impact on water resources consumption and, above all, on the efficiency in the use of them.

After this introduction, our study describes the framework of water usage in the Canary Islands with special attention to the area of analysis, the tourism sector of Puerto de la Cruz. Later, the methodology, aimed to find out which variables have a significant effect on water use in hotels, is explained. Finally, conclusions are posed and recommendations are made, seeking to help to improve the water management in the hotels of Puerto de la Cruz and also to be applied for other island tourism destinations in the world.

This paper is structured into six sections. The first section provides a brief review of the literature on water consumption in tourism sector in the XXI century by forming four groups of articles depending on their main idea. The second section includes the analysis of tourism and water consumption in the Canary Islands and particularly in Tenerife. The third part presents a case study of the hotel sector in Puerto de la Cruz. The fourth part describes the methodology: instruments used in the research and the study variables. The fifth section analyses the results and, finally, the sixth section concludes the paper by identifying the lacks of the study, possibilities to improve it, recommendations for hoteliers and directions for future research.

1. Literature review

There are few studies on the use of water in the tourism sector (with special attention to the hotel sector), although in recent years research has emerged on the demand for tourism water, in particular the analysis of factors influencing the different uses of water by this sector. However, there is still a deficit in the analysis that the impact of tourism has on water resources consumption and above all on the efficiency in the use of them.

According to Gössling (2002), lack of research with a specific focus on water and tourism can also be attributable to the lack of available data. Even within the field of water policy, there has been little research on tourism-related water demand compared to other water uses (Tortella and Tirado, 2011). This occurs because the impact of water demand on the tourism industry is considered insignificant compared to other sectors such as agriculture, industry and households. Global figures suggest that international tourism accounts for less than one percent of national water use (Gössling et al., 2012). However, what is not shown in this figure is the concentrated and accelerated nature of tourism (Emmanuel and Spence, 2009; Essex et al., 2004; Gössling, 2005).

Given that the importance of this topic on literature is relatively new, we have decided to focus our analysis in the period of the XXI century. According with the different lines of research that have been addressed in there, four groups can be conformed regarded the aspects studied on water consumption in tourism sector as the figure 1 shows: state of the art, impacts, water management and best practices.

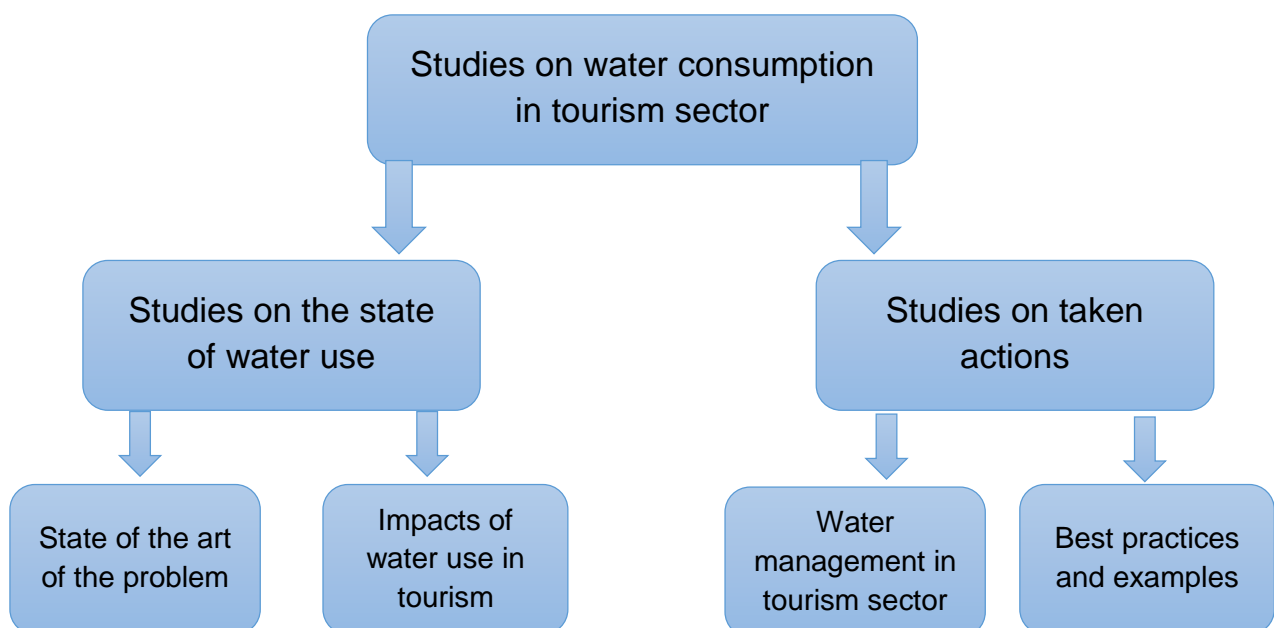


Figure 1. Four groups of the studies on water consumption

Source: Author's elaboration

However, those four groups do not have the same importance in terms of research and impact as it can be seen in the table 1, which offers information not only in the main authors in every topic but also in the number of cites that the main studies have reached.

Table 1. Distribution of the studies on water consumption by categories

Category	Reference	Journal	Cites
State of the art	Gil, M. A., Jiménez, J. B., & Lorente, J. C. (2001).	<i>Omega</i>	546
	Gössling, S. (2001)	<i>Journal of environmental management</i>	221
	Deng, S. M., & Burnett, J. (2002)	<i>International Journal of Hospitality Management</i>	102
	Gopalakrishnan, C., & Cox, L. J. (2003)	<i>International Journal of Water Resources Development</i>	15
	Bohdanowicz, P., & Martinac, I. (2007)	<i>Energy and buildings</i>	221
	Rico-Amoros, A. M., Olcina-Cantos, J., & Saurí, D. (2009)	<i>Land Use Policy</i>	139
	Moliner, J. P., Azorín, J. F. M., Guilló, J. J. T., & Cortés, E. C. (2012)	<i>Papers de turisme</i>	7
	Tortella, B. D., & Tirado, D. (2011)	<i>Journal of environmental management</i>	85
	Hof, A., & Schmitt, T. (2011)	<i>Land Use Policy</i>	78
	Charara, N., Cashman, A., Bonnell, R., & Gehr, R. (2011)	<i>Journal of Sustainable Tourism</i>	71
	Gabarda Mallorquí, A., Ribas Palom, A., & Daunis-i-Estadella, J. (2015)	Investigaciones Turísticas	8
	Dinarès, M., & Saurí, D. (2015)	<i>Documents d'Anàlisi Geogràfica</i>	1
	Gabarda-Mallorquí, A., & Ribas Palom, A. (2016)	<i>International Journal of Water Resources Development</i>	4
Gabarda-Mallorquí, A., Garcia, X., & Ribas, A. (2017)	<i>International Journal of Hospitality Management</i>	5	
Impacts	Hardy, A. L., & Beeton, R. J. (2001)	<i>Journal of Sustainable tourism</i>	268

	Dodds, R. (2007)	<i>Island Studies Journal</i>	41
	Dodds, R. (2007-2)	<i>Current Issues in Tourism</i>	107
	Ribas, A., Calbó, J., Llausàs, A., & Lopez-Bustins, J. A. (2010)	<i>International Journal of Climate Change: Impacts and Responses</i>	14
	Dodds, R., & Ko, S. (2012)	<i>Environmental Management and Sustainable Development</i>	1
	Dodds, R. (2012)	<i>Journal of Sustainable Development</i>	28
	Grydehøj, A., & Kelman, I. (2017)	<i>Area</i>	10
Management	Cashman, A., & Moore, W. (2012)	<i>International Journal of Hospitality Management</i>	19
	Barberán, R., Egea, P., Gracia-de-Rentería, P., & Salvador, M. (2013)	<i>International Journal of Hospitality Management</i>	36
	Kasim, A., Gursoy, D., Okumus, F., & Wong, A. (2014)	<i>Journal of Sustainable Tourism</i>	39
	Ruiz-Rosa, I., García-Rodríguez, F. J., & Mendoza-Jiménez, J. (2016)	<i>Journal of Cleaner Production</i>	13
Best practices	Hamele, H., & Eckardt, S. (2006)	<i>Life Environmental Programme of the European Commission</i>	27
	Erdogan, N., & Baris, E. (2007)	<i>Tourism Management</i>	295
	Mourad, K. A., Berndtsson, J. C., & Berndtsson, R. (2011)	<i>Journal of environmental management</i>	65
	del Mar Alonso-Almeida, M. (2012, October)	<i>Women's Studies International Forum</i>	29
	Wyngaard, A. T., & De Lange, R. (2013)	<i>International Journal of Hospitality Management</i>	20
	Styles, D., Schoenberger, H., & Galvez-Martos, J. L. (2015)	<i>Tourism Management</i>	24

Source: Author's elaboration

Analysing the groups which were formed from our search, we can conclude that the greatest lack of the research was found in the groups of water management and best practices. In our study we put an emphasis on the first group, which includes research on the state of the art.

The use of water is one of the most important environmental impacts of tourism, with the expenditure of this resource having increased considerably in the last years. Gossling et al. (2012) estimates that worldwide tourists spend more water resources when they are on holiday compared to the periods they spend in their homes, namely 300 liters per day versus 160 liters per day. Even if such consumption seems quite high, there are many examples of water use that exceed the average level, obtained by Gössling et al. (2012). For instance, an average water usage at Barbadian hotels is about 839 L/guest-night (Charara et al, 2011). In other case, water use in analysed hotels in Rhodes, Greece, range from 234 to 675L/guest-night (Gössling, 2015).

The water consumption of hotels is much higher than the consumption of households, due in large part to the collective consumption of water produced in these establishments. With this we refer, for example, to the water used for irrigation of gardens, that must be kept attractive, daily cleaning of rooms, filling of swimming pools, kitchen, excessive washing of towels and sheets, etc. On the other hand, the leisure attitude that tourists have when they are on vacation promotes increased spending when the tourist allows small "pleasures" that would not be allowed in everyday life in their usual home, such as longer showers, toilets, etc. (Styles et al, 2015).

At the national level there are several studies of water use within Spain in particular. For instance, Mallorca, Costa Brava, Zaragoza, Barcelona, by autonomous communities and Spain in general. Thus, in Costa Brava (Lloret de Mar) an average water consumption in hotel sector is quite low - about 252 L/guest-night (Gabarda-Mallorquí et al, 2015). In Zaragoza, an average water consumption per guest night in hotel sector is about 396,5 liters per guest-night (Barberán et al, 2013), in the hotels of Mallorca is about 541 liters per guest-night (Tortella and Tirado, 2011).

Many studies have focused on studying the structure of water consumption within a hotel. There is different distribution of water use within the hotel depending on many factors. In the figure 2 major processes that contribute to water consumption are presented.

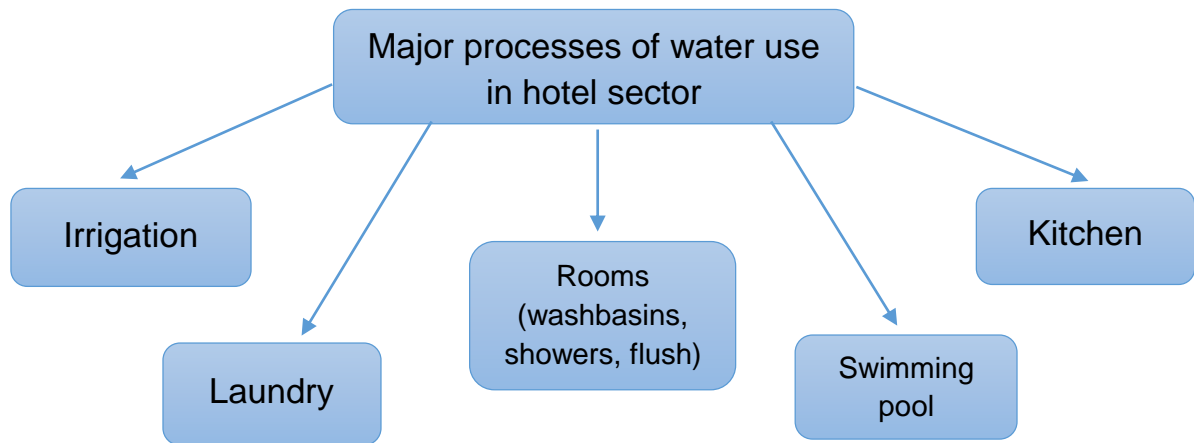


Figure 2. Major processes that contribute to water consumption within a hotel

Source: Author's elaboration

The greatest part of research of water consumption in hotels and other establishment enterprises asserts that the most part of water use is located in hotels rooms for direct uses including taking showers, flushing the toilet, and the use of tap water. In Australia this kind of use takes about 42 % of the total consumption (Smith et al., 2009). According to the study of Gössling (2012) the water consumption in rooms occupies about 20 % per tourist per day in hotels. In the Deng and Burnett's (2002) study this indicator is even more – 30 %. Water consumption in hotels rooms in Spain goes to the washbasin (45 %), to the shower (33 %) and to the toilet (22 %) as was obtained from the study of Cobacho et al. (2005).

Several studies claim that a great part of water use belongs to laundry service. For example, in a sample of hotels with in-house laundry in Hong Kong laundry took the biggest part of water use - about 47 % (Deng and Burnett, 2002). Other studies, on the contrary, give a laundry a smaller weight in the water consuming. The research of Smith et al. (2009) shows that laundry takes just about 15 % of the total consumption. Laundry accounts for about 10 per cent (25 L per tourist per day) of the water used in guesthouses and 5 per cent (47 L per tourist per day) in hotels. Obviously, it depends on the frequency of using laundry service in hotels. Swimming pools represented another important factor of water use, accounting for about 15 per cent of the water demand of hotels (140 L per tourist per day). Indirectly, swimming pools added to laundry, for example, when additional towels were handed out to guests (Gössling, 2001).

Together with those, the literature on the topic has identified and analysed numerous factors that influence the use of water by hotels worldwide. Among them, studies usually highlight physical or general characteristic, facilities and management of a hotel (Gabarda-Mallorquí et al, 2017).

Physical characteristics can include hotel capacity which can be measured in different ways, most frequently in the numbers of beds/available rooms or floor area. This is the most important factor for water consumption because the larger the hotel is the more clients it can allocate and more area of gardens, swimming pools and other facilities are required. So, logically, these facilities need more use of water. Often in this part can be included the items: star category, hotel capacity, chain affiliation (Dinarès, 2015; Tortella and Tirado, 2011). Sometimes these variables are included in a group which is called “general characteristics” and apart from physical indicators of the hotel’s work can include number of employees, occupation level or number of guest-nights (Dinarès et al., 2015).

Among the factors with can influence water consumption in tourist sector seasonality level could be included, such as number of months of activity and occupation level (Tortella and Tirado, 2011).

Analysis of hotel’s facilities is included in every study because facilities require a great amount of water. Among them are gardens, swimming pool, laundries, SPA and other facilities. Also it could be useful to divide swimming pools in indoor and outdoor ones in order to analyse water use separately to study potential differences because an indoor swimming pool could attract tourists to a hotel during the winter period (Gabarda-Mallorquí et al, 2017).

For better understanding use of water in hotels it is necessary to investigate the level of water management in hotels. Charara et al. (2011), Tortella and Tirado (2011), Styles et al. (2015) and other research study the importance of water management and water-saving measures and its influence on water consumption level in hotels. Despite of those efforts, there is still a lack of information on the current level of the state and water saving measures in the industry. Especially there is a lack of such kind of information at island level which is going to be highlighted in our study by addressing water consumption patterns in tourist sector of Tenerife.

2. Water sources and consumption patterns in the Canary Islands

2.1 Water resources in the archipelago

The Canary Islands are an archipelago and autonomous region of Spain located on the Atlantic Ocean, 100 kilometres west of Morocco. It currently has a population of about 2.108.121 inhabitants (ISTAC, 2017) and include seven major islands. The most populated islands are Tenerife (894.636 inhabitants) and Gran Canaria (843.158 inhabitants), which together have 82,4 % of the total population of the archipelago. The less populated island is El Hierro with 10.679 inhabitants. The Canaries are rich in natural resources as minerals, forests, etc., but face the scarcity of water due to the climate and orography.

There are three types of water resources available in the Canaries: surface waters, groundwater and industrial production waters. Surface waters include rainfalls, which are collected in dams, ponds and other deposits. The groundwater comes from the aquifers in two ways: naturally, by water springs, or artificially by galleries and wells. Each island has its own aquifers, which are independent of the rest of the islands (Gobierno de Canarias, 2014).

The total availability of water is presented at the figure 3.

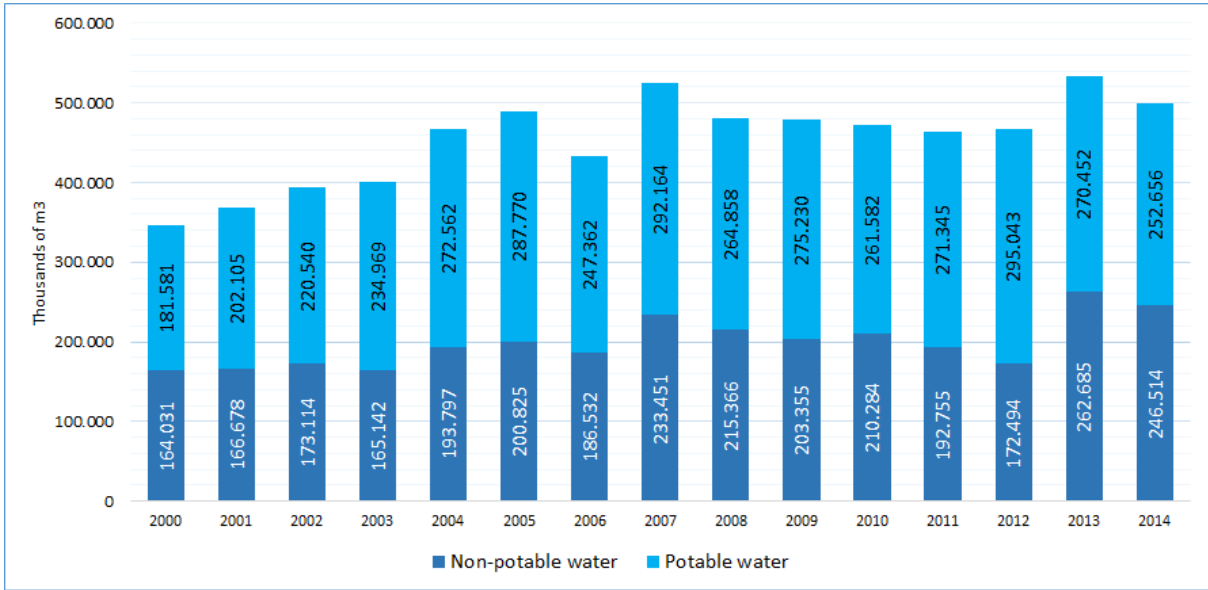


Figure 3. Availability of water resources in the Canary Islands

Source: Author’s elaboration with data from ISTAC (INE)

According to the statistics of the Government of the Canary Islands, the total volume of available water reached 499.170 thousand m³ in 2014. During the last 15 years (from 2000 to 2014) the quantity of available water resources has been increasing. Till 2013 potable water had been increasing faster than non-potable, but from 2013 the volume of non-purified water has increased by more than 50 % due

to a bigger use of desalination. The ratio between the availability of potable and non-potable water remains practically equal – 50,6 %, compared to 49,4 % respectively in the analysed period.

In 2013, desalination was the main source of water consumed with an average share in the archipelago of 85,2% of the total, groundwater was about 6,4 % and surface water - 8,3 %. Those proportions differed on each island and depended on the demand and availability of natural resources. Water consumption per capita reached 142 litres per inhabitant per day in 2013 as the figure 4 shows (Gobierno de Canarias, 2014 & Fundación Centro Canario del Agua, 2004).

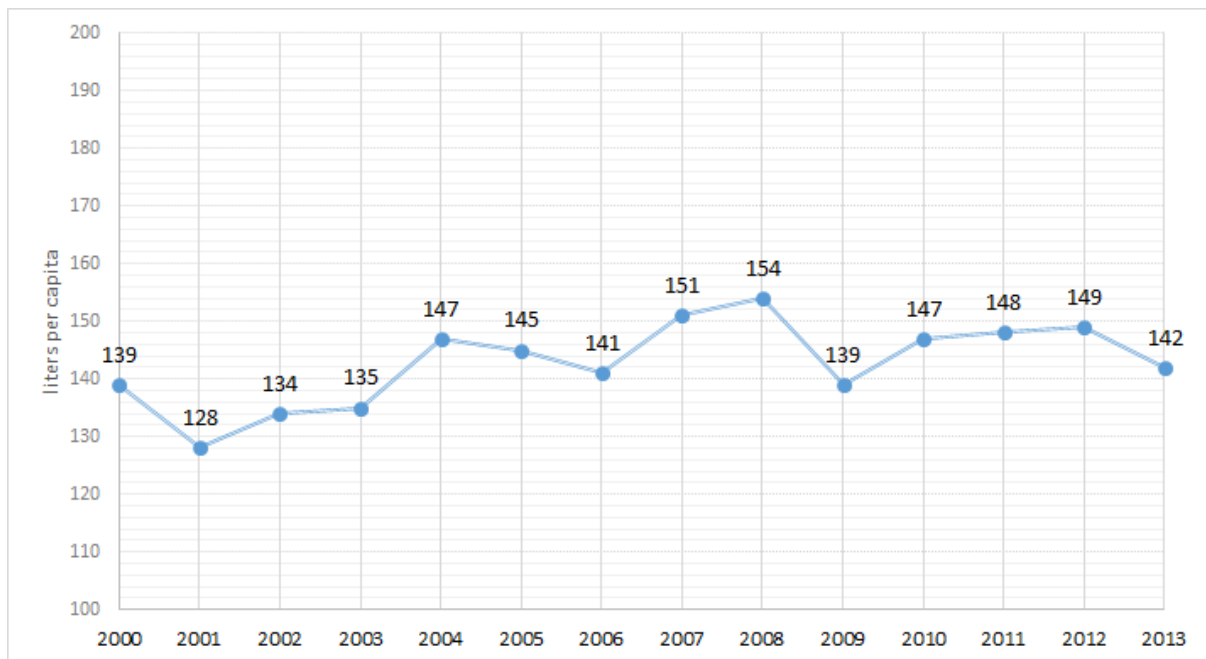


Figure 4. Water consumption per inhabitant per day in the Canaries

Source: Gobierno de Canarias, Informe de coyuntura ambiental. Agua, 2014

The legislation protecting water as a resource has its main milestone in the Law 12/1990, of 26th of July, de Aguas. According to this Law the powers and administrative functions of the Autonomous Community of the Canary Islands in matters of water shall be exercised by:

- A) The Government of the Canary Islands.
- B) The competent Ministry of the Government.
- C) The Island Cabildos.
- D) The Insular Water Councils.

Every island is configured as an independent hydrographic basin in the Autonomous region. Thus, in every island an Insular Water Council is established and it holds the Hydraulic Administration and is

responsible for the management, planning of the water resources. (Consejo Insular de Aguas de Tenerife, 2017).

The activity of The Council is divided into: direct management of regional systems of desalination of seawater and purification of wastewater; of hydroelectric projects, of the desalination plants; and monitoring and control of other hydraulic infrastructures. The Council uses desalination plants and reused water as to decrease the overuse of the water from galleries.

2.2 Water usage by sectors in the Canary Islands

The Canary Islands present an economic structure based on the tertiary sector, where agriculture also holds a significant weight. This conditions the use of water in the Canaries that could be divided into the following categories:

- Agricultural consumption, where the archipelago specializes in water intensive crops such as bananas and tropical fruits.
- Industrial use, although the presence of industries in the Canary Islands is limited and therefore this sector does not have a big impact in water use.
- Urban supply, including personal hygiene, cooking, gardening, street cleaning, etc.
- Tourism consumption, where due to the large growth of the number of tourists in the last years, water use for tourism has been increasing rapidly (Peñate et al., 2008).

Due to the lack of disaggregated data available, the table 2 presents the distribution of demand of water resources existed in the Canaries in 2004.

Table 2. Distribution of water demand by sectors in the Canary Islands in 2004

Island	Domestic	Tourism	Recreative	Industry	Agriculture	Total
Lanzarote	38,6 %	52,9 %			8,7 %	100,0 %
Fuerteventura	46,0 %	25,0 %	12,0 %	4,0 %	13,0 %	100,0 %
Gran Canaria	29,0 %	7,0 %	3,0 %	5,0 %	57,0 %	100,0 %
Tenerife	32,0 %	11,0 %	2,0 %	3,0 %	52,0 %	100,0 %
La Gomera	17,0 %	5,1 %	9,0 %	1,0 %	69,0 %	100,0 %
La Palma	6,0 %	0,0 %	0,0 %	1,0 %	93,0 %	100,0 %
El Hierro	23,0 %	1,1 %	0,0 %	1,1 %	75,2 %	100,0 %
The Canaries	27,6 %	8,4 %	2,4 %	3,4 %	58,3 %	100,0 %

Source: Author's elaboration from Peñate et al., 2008

*in the case of Lanzarote, water demand by tourism, recreation and industrial sectors is considered as one sector.

The analysis reveals that in the Canary Islands the sector which demands water the most is agriculture (58,3 %). Domestic use also requests a great amount of water (27,6 % of the total consumption). Tourism and recreation sector demands about 10,8 % of the all water. And finally, industry demands only 3,4 %. The distribution of water use by sectors in the Canaries is different on every island because of factors such as the climate, the surface used for agriculture, the population, etc. For instance, agriculture in La Palma demands about 93 % of the total available water, meanwhile in Fuerteventura this sector requests only 13 % of the total (figure 5).

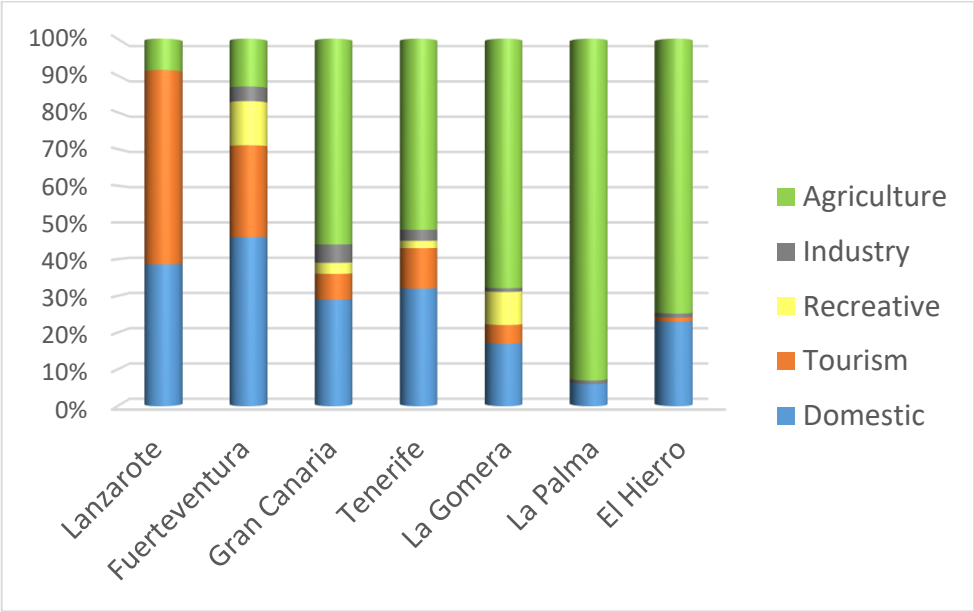


Figure 5. Water demand in the Canary Islands by sectors in 2004

Source: Author’s elaboration from Peñate et al., 2008

Taking the whole archipelago, water consumption by sectors in 2004 can be represented as the figure 6 shows:

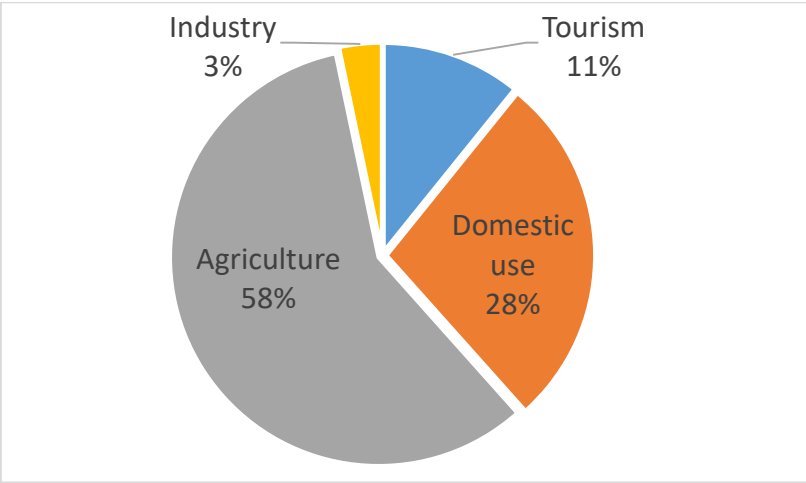


Figure 6. Distribution of the available water in the Canaries in 2004

Source: Author’s elaboration from Peñate et al., 2008

As previously indicated, the last available data about sectors' distribution of available water is from year 2004. Together with the economic evolution, the situation in water consumption has been changing. According to the Report of Environmental sustainability from the Irrigation Plan of the Canaries 2014-2020, irrigation in the Canaries takes about 53% of total water consumption in the archipelago. The proportion of tourism sector in water consumption is increasing rapidly. Thus, the average consumption in tourism reaches 600 liters per bed and day (Gobierno de Canarias, Report El Agua en Canarias, 2014), meanwhile, as was mentioned above, the average consumption per inhabitant is only 142 liters per day, which is less than this indicator in tourism by more than four times. At present, the tertiary sector, mainly tourism and activities linked to it, generate more than 70% of regional wealth. The islands with the highest tourist activity are Gran Canaria, Tenerife, Lanzarote and Fuerteventura (Peñate et al., 2008).

Tourism remains the main engine of economic development, generation of employment and territorial balance in the Canarian archipelago. In 2016 the tourist GDP in the Canaries increased at 9,5 % compared to 2015, to 14.602 million euros (1.268 million euros more than in 2015). The average growth of tourist activity in the period 2010-2016 was + 9,3 % thanks to the growth of the demand of its main international markets, which grew at 8,9 % on average annually. As a result, the contribution of tourism to the island economy as a whole increased from 25,0 % in 2010 to 34,3 % in 2016 (Exceltur y Gobierno de Canarias (2017).

According to the information from Canaragua, due to the increasing number of tourists which choose the Canaries in 2017, tourism takes about one-third of the water demand in the Archipelago with annual consumption of 42 Hm³. This situation differs from the rest of the country. In continental Spain 80 % in the water consumption structure is presented by agriculture, meanwhile in the Canaries the same percentage is destined to the total of the domestic and tourist demand (La Opinión, 2017). The lack of official information might affect the miscalculations of the indicators related to water consumption in tourism. As previously mentioned in 2004, data of the last official Canary wide study, this reached 11 %, thus, an increase of 20 % in around a decade seems to be exaggerated.

Owing to the tourism and industrial development, increasing the population of the archipelago, expanding of the irrigation area, the water demand in the Canaries is increasing annually making the water more and more scarce resource. As a result, many springs were dried and the water from galleries and wells increasingly lost its quality, which brings together a very serious danger of desertification. Therefore, economic initiatives must be taken carefully paying enough attention to the conservation of the environment, the development must be sustainable (Gobierno de Canarias, Report El Agua en Canarias, 2014).

The focus of this study is the relation between tourism and water use. Tourism has increased even more its importance in the Canary Islands, which has put bigger pressure in the natural resources of the archipelago and raise questions about the necessity of changing the current model in order to ensure its sustainability

The debate about tourism and sustainability is not new neither exclusive of the archipelago. The United Nations have declared 2017 as the International Year of Tourism for Sustainable Development, based in five distinctive pillars characterizing that relation. In addition, the 17 Goals for Sustainable Development makes specific mention to the role that tourism can play for achieving a more sustainable development and relates the sectors with several of those goals, among which can be mention on the frame of this study Goal 12: *Ensure sustainable consumption and production patterns*; and Goal 14: *Conserve and sustainably use the oceans, seas and marine resources for sustainable development* (United Nations, 2015).

2.3 Tourism and water resources in the island of Tenerife

The Canaries receive about 15 million tourists every year. During 2016, a total of 5.704.047 tourists were registered in Tenerife with an increase of 1,9 % over the previous year. About 67,5 % of these tourists were staying in hotels, meanwhile 32,5 % chose extra-hotel establishments with total of 42.032.685 overnight stays in hotel and extra-hotel sector, 0,4 % lower than this number in 2016 (Turismo de Tenerife, 2017).

The average duration of the stays of the hosted tourism has been of 7,37 days, the stay in hotels was a bit lower that the average, 7,00 days, meanwhile the average stay in extra-hotel sector was longer, 8,14 days. The occupancy rate has been around 72,0 % on average in the year, which is a 0,8 occupancy points less than in 2016 (Turismo de Tenerife, 2017).

The main markets are United Kingdom, Spain and Germany as the following figure shows.

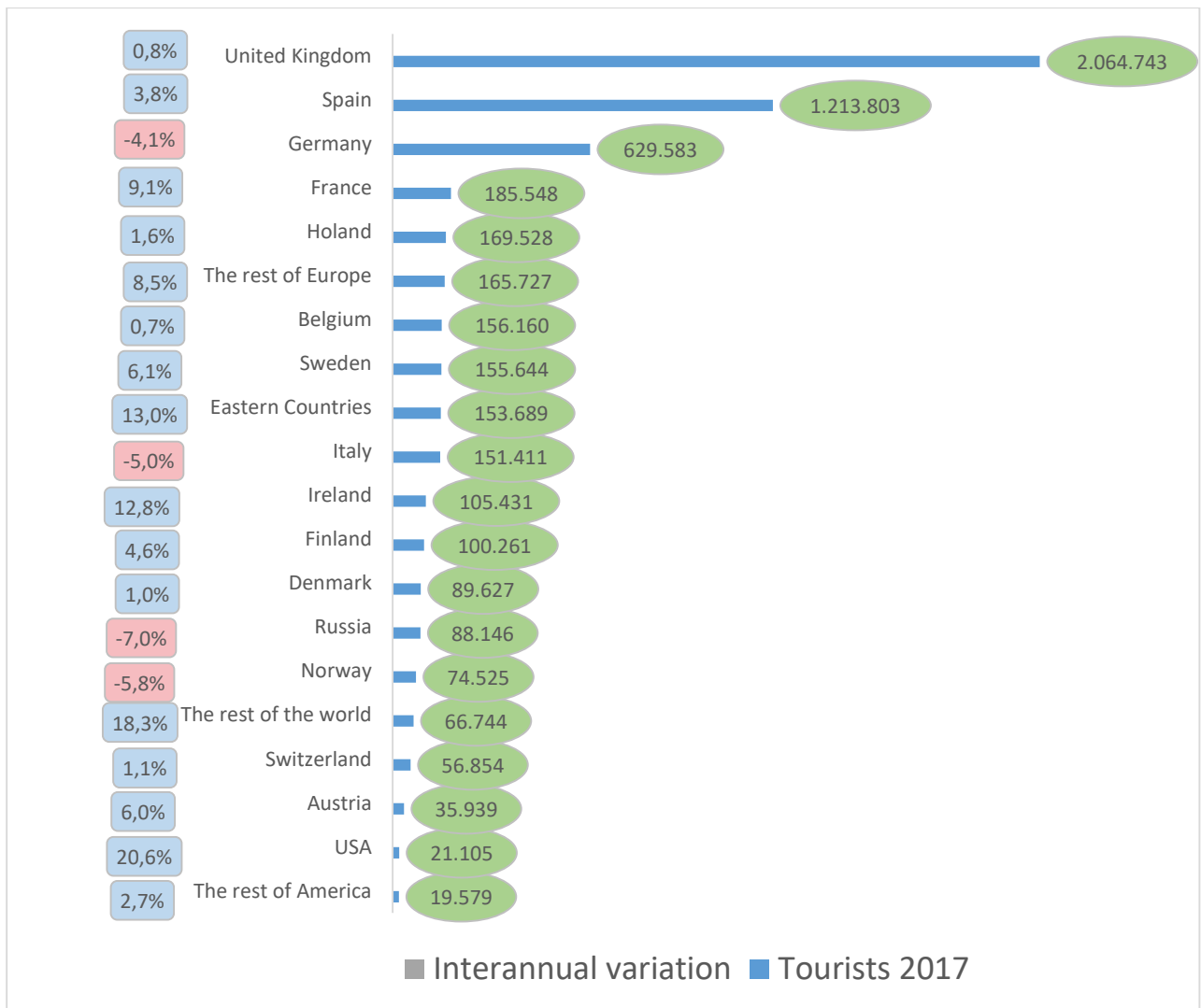


Figure 7. Tourists of the Canaries by nationality in 2017

Source: Author's elaboration with data from Turismo de Tenerife

Due to the limited territory the presence of a steady increase of tourism gives the question of the scarcity of resources even more importance. Regarding the water resources in Tenerife, more than 80% of the water consumed in Tenerife comes from galleries and wells. The existence of the galleries is explained by the volcanic characteristics of Tenerife and its porous soils, which let the rainwater and the water from the condensations in the wooded zone seep into the subsoil and collect it to aquifers. There are about 1000 galleries with a total length of about 1700 km and 500 wells with 120 meters of depth in Tenerife, thus guaranteeing the water supply to the population of Tenerife (Turismo de Tenerife, 2017). Apart from these natural deposits there are different reservoirs with capacity of 22 hm³, including about 8.100 private ponds (Consejo Insular de Aguas de Tenerife, 2010).

In the south of the island treated water and water from underground galleries is used. Treated water includes desalination, proper treatment, biological depuration and reuse (Consejo Insular de Aguas de

Tenerife, 2015). All the water is distributed through a complex network of channels with length of more than 4.000 km.

The Insular Water Council of Tenerife implemented the Insular Hydrological Plan since February 1997. Groundwater remains the main source of water in the island with 84 % of total water, consumed in Tenerife, showing high dependence on the underground resources (El Día, 2017). The level of the usable groundwater depends on the rainfall. Also there are two significant problems related to this source: overexploitation and deterioration of quality. The last one is caused by high presence of fluoride and pollutants from agriculture. Thus, The Council had to increase the industrial production of water and to preserve of the aquifers (Consejo Insular de Aguas de Tenerife, 2010). Nowadays, about 14 % of the water, consumed in Tenerife, comes from the sea (El Día, 2017).

3. Puerto de la Cruz as a study case

We centre this study in the hotel sector of one of the main tourist destination of the Canaries – Puerto de la Cruz. The municipality of Puerto de la Cruz is located in the north of the island of Tenerife and it has an extension of 8,73 km², being the smallest of the island. Puerto de la Cruz amounts a population of 30.036 inhabitants according to ISTAC data. The municipality limits with the municipalities of the Orotava (to the east and the south) and Los Realejos (to the west). The micro-destinations delimited for Puerto de la Cruz are those that can be seen at the figure 8.



Figure 8. Tourist entity: Tourist Puerto de la Cruz; tourist cores: Playa Jardín – Marítim, Conjunto Histórico, Taoro – La Paz, Martíánez

Source: ISTAC, Entities and tourist nuclei: Cartographic Notebook

The suitability of Puerto de la Cruz as focus of the study stands on several reasons. Puerto de la Cruz is the third municipality of Tenerife by the numbers of tourists received after Adeje and Arona. This means that a great amount of water goes to provide the tourism sector and increase the necessity for qualitative water management would help to use it optimally. In Puerto de la Cruz the municipal water basically comes from the galleries and a small part is biologically purified water, which amount is increasing every year. At the same time, Puerto de la Cruz was declared as the vulnerable area by

Decree 261/1996 of 16 February 1996 on the protection of waters against pollution caused by nitrates from agricultural sources and has been designated to form part of the RZP Located in the TT.MM of La Orotava, Puerto de la Cruz and Los Realejos, below the quota 300 msnm (Consejo Insular de Aguas de Tenerife, 2017).

Although Puerto de la Cruz was one of the first tourist destinations in Spain, over the years it has suffered the obsolescence of tourism infrastructures. This, together with a great lack of investment, has resulted in the loss of competitiveness of the municipality. In the 60s, profiting the tourism boom, Puerto de la Cruz was consolidated as an international tourist destination. Since that moment, there has been an excessive growth that was not properly channelled, leading to a situation of stagnation characterized by insufficient infrastructures and the state of obsolescence of accommodation establishments (Álvarez, 2004). This is evident given the loss of attractiveness, competitiveness, market share and business profitability (Simancas Cruz y García Cruz, 2015).

In light of this situation, and within the framework of the Horizon 2020 Spanish Tourism Plan and the Agreement for the competitiveness and quality of tourism in the Canary Islands 2008-2020, it was proposed to form a consortium that facilitated and allowed to carry out the necessary actions to ensure the renovation and rehabilitation of Puerto de la Cruz as a tourist destination. Thus, the Consortium for Urban Rehabilitation of Puerto de la Cruz was born in 2010. Its purpose is to carry out the necessary actions for the rehabilitation, modernization and tourist renewal of the municipality, through the Tourism Infrastructure Rehabilitation Plan and Plan of Modernization, Improvement and Increase of the Competitiveness of Puerto de la Cruz.

Those Plans included different objectives. Among others, to increase the sustainability of mobility following the international trend and to position one way or another as Smart City. Puerto de la Cruz tries to combine the philosophy of Smart City with that of Charming City, which includes the sustainable use of resources as well. Within this strategy, water is recognised as one of the most important resources in the tourism sector, especially in hotels, and it is a part of the politics of sustainability which is essential for new development of the Puerto de la Cruz.

In 2017 Puerto de la Cruz received 933.110 tourists (+6,5 % compared to 2016), which is 16,4 % of the total number of visitors of Tenerife, and 73,5 % of those chose hotel sector to stay. Regarding the number of overnight stays, Puerto de la Cruz (6,73 million) had levels well below those of other municipalities such as Adeje (14,92 million) or Arona (12,43 million), although it amounted for the 16,0 % of the total nights of stay in Tenerife. The average stay in Puerto de la Cruz (7,22 nights) was about one day less than average in the municipalities of Adeje and Arona, although it equalled to the average stay on the island.

For the same year, Puerto de la Cruz had about 116 accommodation establishments, 20 more than in 2016, and 61 out of 116 belonged to hotel sector. In terms of the number of places, there were 21.961 places of accommodation registered, after a sharp decline in 2015 that was the culmination of the negative trend taking 2010 as the reference (see figure 9). About 74,7 % of the total places belonged to hotels.



Figure 9. Places offered in Puerto de la Cruz

Source: Author's elaboration with ISTAC data

The marked fall of the year 2015 can be explained by the planned renovation of around 1,900 beds that took place during that year, which is why these places were no longer part of the offer (Consortio para la Rehabilitación de Puerto de la Cruz, 2012).

As for the occupation, the residential establishments of Puerto de la Cruz reached in 2017 an occupancy rate of 74,6 %, which is 1,8 points higher than the occupancy rate in 2016 and 0,2 points lower than the average of the island (ISTAC, 2017). Regarding the ADR of the establishments of the municipality, this presented an average of 52,02 €, being much lower than the average for the establishments of the island (86,00 €). The RevPAR of the establishments of Puerto de la Cruz was 43,50 € on average, which compared to the average levels of the island is approximately 28,50 € lower (ISTAC, 2017). The annual evolution of performance indicators since 2010 can be seen in the figure 10.

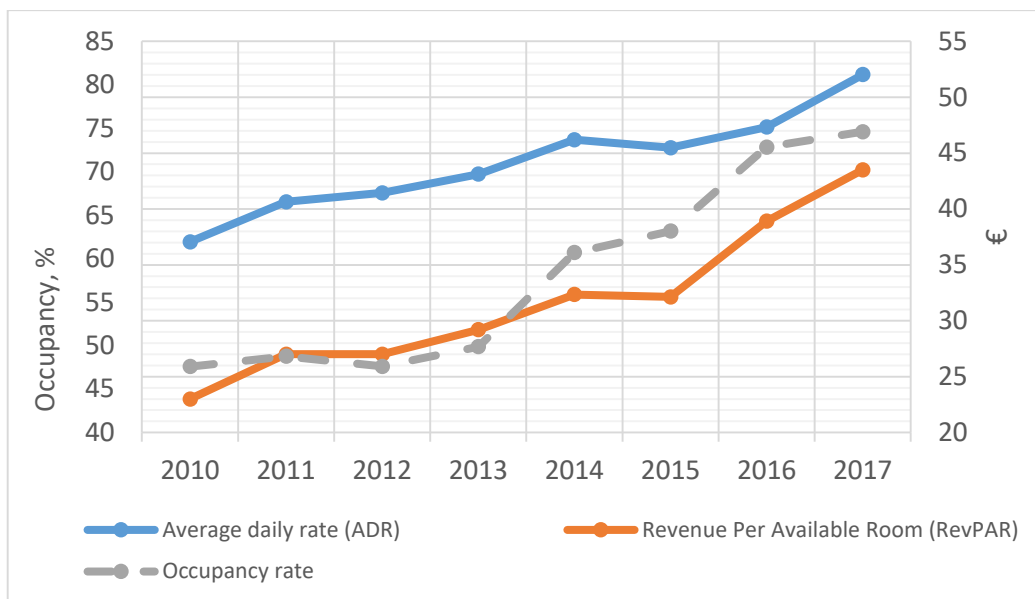


Figure 10. Performance indicators in Puerto de la Cruz

Source: Author's elaboration from data of ISTAC

The evolution of profitability indicators has been positive, with ADR and RevPAR having increased by 40,4 % and 89,1 % respectively over the base year (2010). The occupation has increased by approximately 27 points, although should be taken into account that the value of 2015 and 2017 can be influenced by the above-mentioned elimination of 1,900 places that were under renovation.

Based on the data provided by Turismo de Tenerife, during the year 2017 approximately 45 % of the tourists who visited Puerto de la Cruz were Spanish, followed by the German tourists with 21 %, concentrating between both nationalities two thirds of the demand. This presents a distribution quite different from the general trend on the island (figure 11).

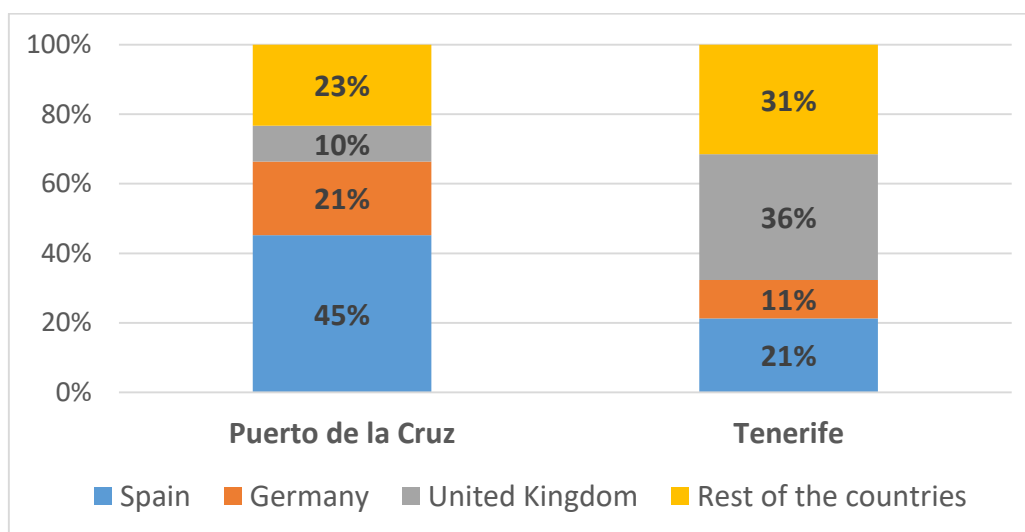


Figure 11. Tourism by nationalities in 2017

Source: Author's elaboration from data of Turismo de Tenerife

The main reasons why tourists staying in Puerto de la Cruz choose Tenerife are the climate / sun, the landscape, the tranquillity, the rest and the relax (Plan for the Rehabilitation of Tourist Infrastructures of Puerto de la Cruz (PRIT).

As for the places tourists visit, an analysis with tools such as Sightsmap shows the main points of interest for the tourists who visit Puerto de la Cruz (figure 12).



Figure 12. The main points of interest that tourists visit to Puerto de la Cruz

Source: Author's elaboration from data of <http://www.sightsmap.com>

This website allows us to see the sights in Puerto de la Cruz where people take more pictures. Ranges are displayed by colour (from yellow to blue).

According to this map the places of interest are:

1. Loro Parque
2. Avenida de San Telmo
3. Concordia Playa
4. Paseo San Telmo
5. Bahia Principe San Felipe
6. Plaza del Charco
7. Blue Sea Interpalace
8. Plaza de Europa
9. Hotel Best Semiramis
10. Lagos Martiánez.

All above-mentioned factors considered in the characterization of tourism and hydrological resources of the Canary Islands and the municipality of Puerto de la Cruz in particular, lead to conclude that this area is an ideal choice for our study. First, this is one of the main tourist destinations of the Canary Islands with a large hotel network. Till the last years it was stagnated but now we can see how the efforts to recover the destination are improving its profitability. Secondly, Puerto de la Cruz was declared as the vulnerable area, which was caused by pollution from agricultural sources, and it has a large problem of scarcity of water resources. Also, Puerto de la Cruz is trying to be positioned as Smart City, which needs a compromise on sustainable use of resources. As it was said before, water is one of the most important resources in the tourism sector, especially in hotels, and it is a part of the politics of sustainability which is oriental for new development of Puerto de la Cruz. Finally, the current study is the first step of a more global study of water use and water management in tourism sector in Tenerife, which started in November, 2017.

4. Methodology

4.1 Sample and instruments

This section describes the sample used in the research, study variables and methods used to obtain these data. In the study, we examined water consumption in the hotel sector of Puerto de la Cruz, Tenerife. Our sample is represented by 50 hotels of different categories and the year of reference is 2016. In spite of the fact that many studies choose the peak tourist season for conducting the study (Gabarda-Mallorquí et al, 2017), we have opted for choosing the whole year due to the fact that the climate of Puerto de la Cruz is mild throughout all the year and the destination does not have any sharp jumps and falls on tourists' arrivals.

In 2016 there were 61 hotel establishments registered in the town (Turismo de Tenerife, 2017). A list of hotels for our study was obtained from the database of Asociación Hotelera y Extrahotelera de Tenerife (ASHOTEL), also we confirmed if all the hotels were active in platforms as Booking.com and TripAdvisor. The list included 51 hotels in Puerto de la Cruz: 2 five-star, 28 four-star, 15 three-star, 3 two-star and 3 one-star hotels. One two-star hotel was closed, so, the final sample included 50 hotels. The difference between the number of registered establishments and the list we obtained could be explained by two factors. First, the data from Tourism in Tenerife included apart-hotels, but we decided to conduct the survey only with hotels so as to keep the homogeneity of the sample. Also we could reach the data only from those hotels which had an agreement with TripAdvisor and Booking. And it is possible that the Ashotel's database has not been updated recently. We chose to conduct the survey among hotels excluding apartments because it is easier to obtain the information about water use for hotels and usually they consume much more water than apartments because of the amount of facilities they have, i.e: bigger gardens, etc. (Gössling, 2015).

For obtaining the information for our study we used two methods: first, a 45-item questionnaire which included asking data about the hotel and its water consumption in 2016 and, secondly, qualitative interviews. The survey included a question for managers to choose whether or not give us a more in deep personal interview about water consumption. The questionnaire was mainly sent by e-mail to directors of the hotels and in several cases - to their managers. It included both physical and operational factors related to water consumption as well as motivational factors behind the decision-making process (Dinarès & Saurí, 2015).

The questionnaire was structured in four main sections: general characteristics of the hotel, water-related units, water consumption and actions of water management. The first section "general characteristics" included information about chain affiliation (if the hotel is independent or belongs to a chain), the size measured with numbers of beds, hotel surface, star category, number of employees,

guest-nights and occupation level in 2016. The second section asked about units related to water consumption as presence of laundry service, kitchen, swimming pools, SPA or similar, gardens and golf camps, also surface of gardens and golf camps. The section dedicated directly to water consumption was comprised of the following items: water consumption in 2016, total and divided by rooms, kitchen, swimming pools, laundry service, SPA or similar, gardens and camp of golf. Apart from this division by facilities we included the division of water use by different sources of water as municipal, recycled or well water so as to understand better which source had the biggest weight and where the potential could be found. The part referred to water management was composed from different actions and measures which could be taken by the hotel so as to improve water consumption. In this part of the questionnaire we asked about existence of environmental policy or program and about activities related to environmental protection and water saving (Erdogan & Baris, 2007). Also this part included different motivational factors which can influence on the decision-making process as the interrogated people could rang them from not important to very important. In the end of the document we asked hotels to put the name of their hotel and their e-mail in case they want to receive results of the study. The questionnaire is presented in the Annex.

About 80 % of the questions were close-ended, while the rest had a single answer format. The design of the questionnaire was based on the literature on water consumption and water management, especially in hotel sector. A pre-test for the questionnaire was run with several professionals who had experience in water use area to ensure its comprehension and validity. After that some adjustments were made the final version was sent by e-mail the link using the Google docs platform.

As remarked before, this study is the first step of the implementation of a more global research on water consumption and water management in the tourism sector of Tenerife, which is called ACUATUR. Thence, first we sent the questionnaire from the official e-mail of the project, explaining the importance of the research and guaranteeing the confidence of the data they sent to us. Also we proposed in the e-mail that, if the hotel was interested in receiving the result of the research, we could send it to them.

Four days after the first emailing it was decided to visit hotels of Puerto de la Cruz as to confirm the receiving of the questionnaire and if it was resent to the person responsible for water use of the hotel. Then we visited 22 hotels (44 % of the total), several from each category, what helped us to obtain more answers. We conducted two face-to-face qualitative interviews with managers of two hotels. They lasted on average 15 minutes each one and mostly included the managers' opinion about the water management existed in the establishments.

4.2 Study variables

The choice of study variables was based on similar studies about water management in hotel sector that were adapted to our study case. As the dependent variable we chose litres of water consumption per guest-night (LGN), which was calculated by dividing water consumption in 2016 by number of guest nights during the same period (Gabarda-Mallorquí et al, 2017). This indicator seemed to us more adequate than total water consumption, since this last indicator did not let us compare water use between the hotels as it depended on the hotel size, etc.

According to many authors, size is one of the most important factors of water consumption. Also it depends on the hotel category, size, the number of nights stayed, number of rooms, etc. (Barberán et al, 2013). The hotel capacity was included as the first variable, which was measured as number of beds and the floor area in m². In this case the floor area included the whole territory of the hotel - rooms, facilities, gardens, etc. Also we included variables of facilities and leisure structures that required water. These variables included swimming pools, kitchen, SPA, gardens, laundry service and golf camps. Mentioned variables were dichotomous and indicated presence (1) or absence (0) of these facilities.

Swimming pools, which according to several studies mentioned above could occupy a great part of water consumption in hotels, were also included. Some studies divide this variable into two categories: indoor and outdoor pools but the climate in Puerto de la Cruz is quite stable during the year and the hotels do not have indoor pools, therefore this division did not seem useful for our study. The variable "Gardens" included gardens and other facilities which needed irrigation. The hotels are situated in the city area and do not have large outdoor areas, therefore we did not expect that this variable would have a great effect on water consumption. We included in the survey a question about the property of the hotel - if they belonged to a hotel chain or were independently operated. This variable was included as a dichotomous one (independent operation = 1, affiliation with a hotel chain = 0). The number of stars was included to the study variables as well as it can be useful for later classification of the establishments.

Finally, we included the number of water saving measures adopted in the hotel as a study variable. The hotels had to mark the measures their hotel implemented, among them:

- Employee involvement in water management practices;
- Water-efficient washing machines, dishwashers, etc. with control system of water consumption;
- Systems for reusing water for toilet flush;
- Water-saving irrigation technologies / system in gardens;
- Selection for the gardens plants that require little water or/and native vegetation;

- Environmental certification;
- Calculating costs saving from implementing environment protection measures;
- Encouraging hotel's employees to propose alternatives for saving resources;
- Environmental policy or program;
- Including environmental issues to marketing policy;
- Water-saving system / devices in taps, toilet flush, shower heads, etc.;
- Environmental awareness actions among its customers, etc.

The description of the study variables is presented in the table 3.

Table 3. Study variables: name, description and unit of measure

Name	Description	Unit of measure
LGN	Water consumption per guest night	liters
Physical characteristics: Star-rating category	Star-rating category	number of stars
Hotel chain or independently operated	Dichotomous variable indicating affiliation with a hotel chain (0) or independent operation (1)	-
Hotel capacity	Number of beds available	units
Floor area (total)	Surface area occupied by hotel building	m ²
Floor area for gardens, parks, etc.	Surface area occupied by hotel gardens and lawns	m ²
Staff	Number of employees	persons
Facilities that require water: Laundry Swimming pools SPA and similar Gardens Kitchen	Dichotomous variables indicating presence (1) or absence (0) of the facility	-
Environment protection and water saving measures	Number of environment protection and water saving measures, adopted by the hotel	unit

Source: Author's elaboration

5. Results

Being this a pioneer study in Puerto de la Cruz, we found certain obstacles obtaining the information. In the most of the cases, the hotels could not divide water consumption by processes of their origin (rooms, kitchen, swimming pools, etc.). This fact complicated the analysis of the results because this division could help to identify places of high water use. It could be a good indicator to analyse results of implementing water saving measures, separated by the origin of the water consumption. The lack of cooperation also harmed the results of the surveys that depended on the courtesy of hotel managers to answer it.

So, finally, full data was obtained from 5 hotels out from 50. 40 % of the data were received from 4-star hotels, 40 % from 3-star hotels and 20 % from 2-star ones. The final response rate was 10 % which is less than response rates obtained in other surveys (Deng & Burnett, 2002, Dinarès & Saurí, 2015, Gabarda-Mallorquí et al, 2017).

According to the results, the water use in the hotels could be divided by major processes of their origin in the next way (figure 13).

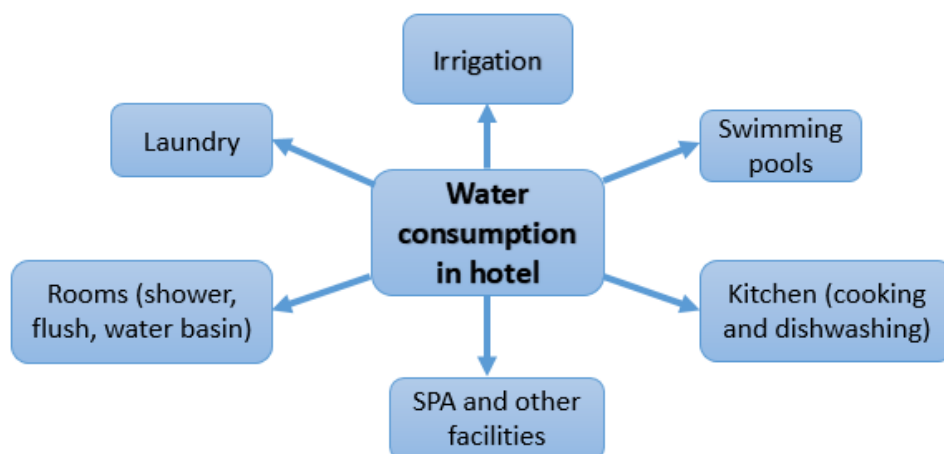


Figure 13. Water use in the hotels of Puerto de la Cruz, Tenerife

Source: Author's elaboration

The main characteristics of the variables included to our model are presented in the table 4. The analysis shows that there were no 1- and 5-star hotels in the sample, 2-star hotels represented 20 % of the hotels and 3 and 4-star hotels took 40 % for each group. 40 % of the hotels belonged to a hotel chain and 60 % worked independently.

Table 4. Description of the study variables

Variable	Value	Frequency	Percentage (%)	Average
Water consumption per guest night	LGN, liters	-	-	269,0
Star-rating category	**	1	20 %	-
	***	2	40 %	-
	****	2	40 %	-
Physical characteristics: - Hotel chain or independently operated - Hotel capacity - Floor area (total) - Floor area of gardens, parks, etc. - Number of employees	0 = chain	2	40 %	-
	1 = independent	3	60 %	-
	beds	-	-	294,4
	m ²	-	-	9.035,01
	m ²	-	-	6.625,00
- Number of employees	persons	-	-	51
Facilities that require water: Laundry	0 = No,	2	40 %	-
	1 = Yes	3	60 %	-
Swimming pools	0 = No,	0	0 %	-
	1 = Yes	5	100 %	-
SPA and similar	0 = No,	3	60 %	-
	1 = Yes	2	40 %	-
Gardens	0 = No,	2	40 %	-
	1 = Yes	3	60 %	-
Kitchen	0 = No,	0	0 %	-
	1 = Yes	5	100 %	-
Number of water saving measures	unit	-	-	7,4

Source: Author's elaboration

According to the table 4, the average water consumption per guest night was 269,0 liters, with an average number of beds up to 294,4, an average floor area of 9.035,01 m², and an average staff of 51 employees.

The analysis of the presence of facilities that required water showed that all the hotels had kitchen and swimming pools. 60 % of the sample had laundry service and gardens and 40 % had SPA and similar facilities. None from the hotels had a golf camp. The number of environmental and water saving measures adopted in the hotel varied from 2 to 11 giving on average 7,4.

A linear model was proposed using litres of water consumption per guest-night as the dependent variable and the above mentioned variables as independent ones. The data was analysed using SPSS v.24. For explaining the correlation between the variables we used the R² coefficient. The results are presented in the table 5.

Table 5. Results of correlation of the variables with water consumption per guest-night

Variable	Coefficient R ²
Water consumption per guest night	-
Star-rating category	0,293
Physical characteristics:	
- Hotel chain or independently operated	0,023
- Hotel capacity	0,003
- Floor area (total)	0,615
- Floor area of gardens, parks, etc.	-
- Number of employees	0,152
- Occupation rate	0,649
Presence of facilities that require water:	
Laundry	0,001
Swimming pools	-
SPA and similar	0,071
Gardens	0,023
Kitchen	-
Number of water saving measures	0,385

Source: Author's elaboration

According to the results there are three variables which affected the most on the water consumption per guest-night. These variables are: floor area, occupancy and number of water saving measures. Large hotels tend to consume more water per guest-night than smaller ones (Gabarda-Mallorquí et al, 2017). Also large hotels usually have a higher occupation rate which explains why the occupancy had a great effect on water consumption as well. Those hotels with large number of water saving and environment protection measures consumed less water than those with low number of these

measures. They installed water saving system/devices in the rooms and kitchen, possessed environmental certification, included environmental issues to marketing policy, etc.

The other variables were not found significant. It could be explained by two reasons. First, it could be due to the special characteristics of Puerto de la Cruz, different from samples of other studies that found some of those variables significant (Dinarès & Saurí, 2015). Also we received the information from only five hotels which could not represent the sample accurately enough.

The figure 14 presents which water saving measures were adopted in the hotels.

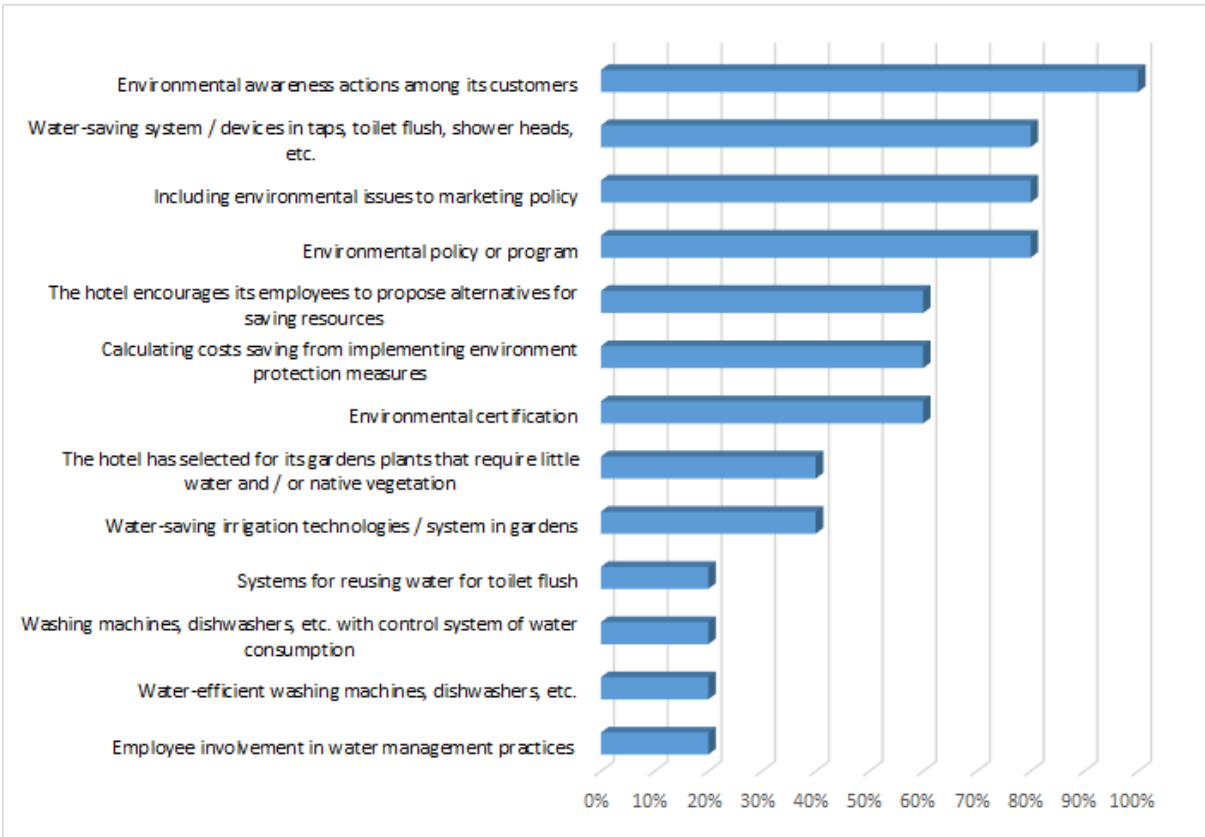


Figure 14. Water saving measures adopted in the hotels of Puerto de la Cruz (adopted from Dinarès & Saurí, 2015)

The figure 14 shows that the most commonly adopted measures to save water were environmental awareness among clients (100 %), the application of water-saving devices in taps, showers, etc. (80 %); including the environmental issues to the marketing policy and presence of environmental policy or program (both 80 %). There are several water-saving measures that were not adopted by any of the hotels from the sample. They included possession of rainwater harvesting system and a wastewater treatment system for later reuse. None of the hotels had a system of reusing water neither they had their own deposits.

Motivational factors behind the decision-making process to adopt water-saving measures (Dinarès & Saurí, 2015) were also included to the questionnaire. The results are presented on the figure 15.

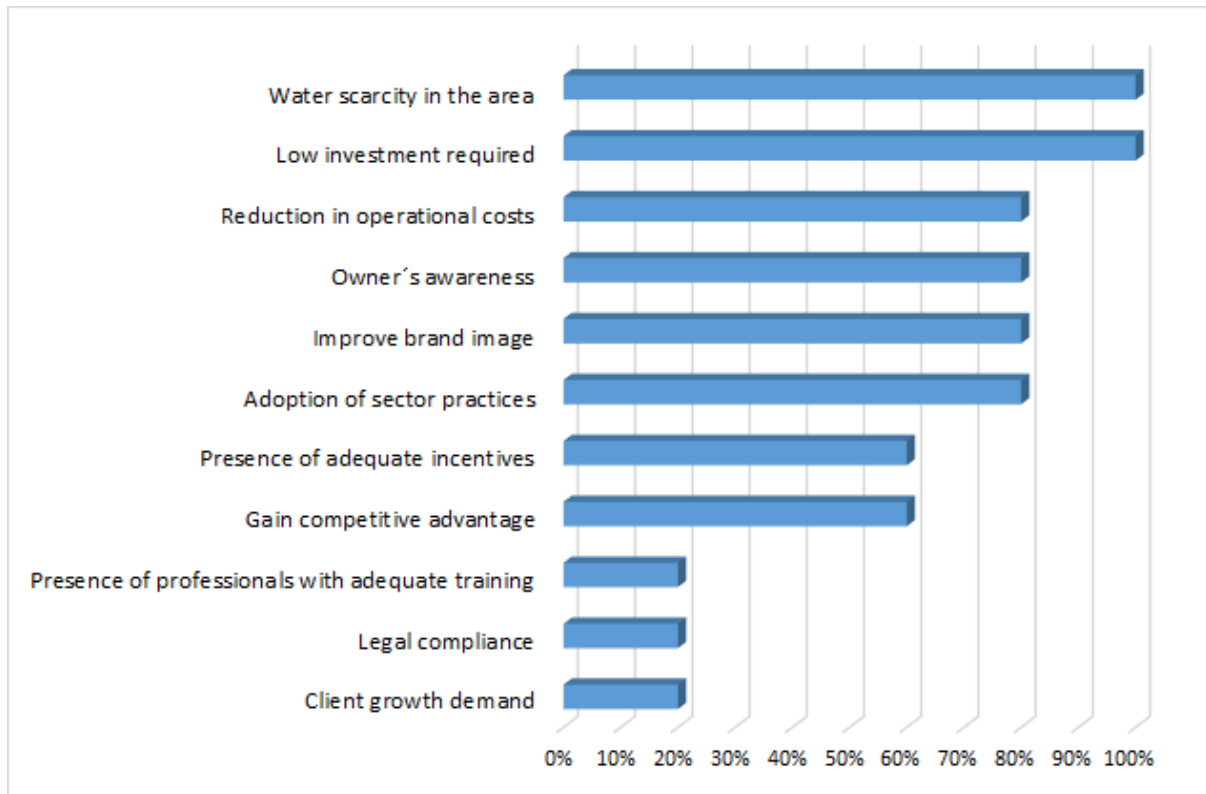


Figure 15. Motivational factors behind the decision-making process to adopt water-saving measures (adopted from Dinarès & Saurí, 2015)

The figure 15 shows that the most important factors to make a decision about adoption of water saving measures in the hotels could be water scarcity in the area and low investment required.

As we were told at personal interview, the hotel managers were concerned about water saving in their hotels. They understood the importance of the problem, especially because this is an island tourism destination which suffers from scarcity of water. In spite of their concern, the managers noticed that their hotels did not pay enough attention to water saving measures neither to detailed control of water use. For example, the interviewees informed us that in their opinion it could be useful to control water use dividing it by major processes of its origin. This division could help to identify the processes which consume a great quantity of water and to adopt water saving measures there.

The questionnaire showed that only 20 % of the hotels divided water consumption by its origin as rooms, kitchen, swimming pools, laundry service, gardens, SPA and other facilities requiring water. The hotels using this division adopted a lot of measures which could help to reduce water consumption as well. As a result, this group of hotels had one of the lowest indicators of litres per guest-nights.

6. Conclusions

This study analysed water consumption of the hotel sector of the northern part of Tenerife - Puerto de la Cruz, which is one of the most important tourist destination of the Canary Islands. We described and explored the influence of the main variables which could affect the water use in the hotels. The key factors that we identified could help the hotels to improve their system of water management and to be more resistant to the changes in water availability in the island.

The low response rate, 10 %, might have not allow us to obtain enough data to explain accurately water consumption in hotels. Such low response rate could be explained by the lack of awareness of the hotel managers of importance of this problem in the island. One hotel responded that such studies did not seem essential to them, which means that it could be important in the future to involve different hotel associations, government structures, etc. to such kind of studies. It could help with better understanding of these mechanisms.

The variables that were found significant for the water consumption in the hotels of the sample are floor area, occupancy and number of water saving measures. This confirms the findings from the other studies in this area. Although previous studies showed the significance of the presence of gardens and laundry on water use, in the case of Puerto de la Cruz these variables did not have a significant effect. Implementing of water saving measures was found essential on water consumption. The hotels, who implemented a great number of environmental and water saving activities, consumed less water per guest-night than the hotels who did not adopt these measures. The importance of environmental and water saving practices should be explained as to increase the efficiency of water management in hotels.

According to the previous studies, the dividing of water consumption by processes of their origin (rooms, kitchen, swimming pools, etc.) is important because this division could help the hotels to identify places of high water use. It could be a good indicator to analyse results of implementing water saving measures, separated by the origin of the water use. Only one hotel from the sample had the practice to divide water by processes of their origin. All mentioned above reveals that there are still many flaws and points to improve in water management in the hotel sector of Puerto de la Cruz.

It is necessary to deepen the research in this field to establish methods of correct water management that can be generalized. The research needs a greater collaboration of the hotel sector to obtain data that allow building an adequate strategy. The aspects analysed in the current study could help to develop a policy related to the water saving initiatives in the area and to make the destination more resistant to the changes in water availability in the island, which could be useful for other island destinations as well.

7. References

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Annex I Questionnaire “Análisis de la gestión del agua en el sector turístico”

Desde la Universidad de La Laguna estamos desarrollando un estudio con el objetivo de realizar un diagnóstico sobre la gestión del agua en el sector turístico, concretamente en el ámbito hotelero. Este cuestionario forma parte de esta investigación. Su colaboración resulta fundamental para poder obtener resultados que nos permitan hacer propuestas de mejora en la gestión de un recurso básico para nuestras islas. La información que nos proporcione será usada de modo confidencial. De todas maneras, si lo considera oportuno, puede especificar al final de este cuestionario el nombre de su hotel con el fin de añadirles como empresa colaboradora en esta investigación en la difusión de los resultados. Una vez finalizado el estudio será para nosotros un placer enviarle un informe con los resultados más relevantes. Puede contactar con nosotros a través de la cuenta de correo electrónico acuatur@ull.edu.es. ¡Muchas gracias por su tiempo!

1. Propiedad del hotel

- Es independiente
- Forma parte de una cadena

2. Número de camas

3. Categoría del hotel

- 1 estrella
- 2 estrellas
- 3 estrellas
- 4 estrellas
- 5 estrellas
- Otra categoría

4. Número de empleados/as

5. Señale los espacios/servicios de los que dispone el Hotel

- Cocina
- Lavandería
- Piscina
- Spa o instalaciones similares
- Campo de golf
- Jardines

6. Superficie total del hotel en metros cuadrados

7. Superficie total del hotel en metros cuadrados destinada a zonas verdes (jardines, campo de golf,...)

Si no incluye información en esta pregunta entenderemos que el hotel no dispone de zonas verdes

Tu respuesta

8. Superficie total del hotel en metros cuadrados destinada a campo de golf

Si no incluye información en esta pregunta entenderemos que el hotel no dispone de campo de golf

Tu respuesta

9. Número de pernотaciones en 2016

Tu respuesta

10. Nivel de ocupación en 2016 en porcentaje

Tu respuesta

11. Consumo TOTAL de agua en 2016 (en metros cúbicos o litros)

Por favor, indique si el dato está en metros cúbicos o en litros

Tu respuesta

12. Porcentaje del agua consumida en el 2016 que procedía del sistema municipal

Tu respuesta

13. Porcentaje del agua consumida en el 2016 que procedía de sistemas de reutilización del propio hotel

Si no incluye información en esta pregunta entenderemos que el hotel no dispone de sistemas de reutilización de agua

Tu respuesta

14. Porcentaje del agua consumida en el 2016 que procedía de depósitos propios

Si no incluye información en esta pregunta entenderemos que el hotel no dispone de depósitos propios de agua

Tu respuesta

15. Consumo de agua en 2016 en HABITACIONES (en metros cúbicos o litros)

Por favor, indique si el dato está en metros cúbicos o en litros. Si esta pregunta no se responde entenderemos que no dispone de la información.

Tu respuesta

16. En el caso de que el hotel disponga de cocina propia indique el consumo de agua en 2016 en COCINA (en metros cúbicos o litros)

Por favor, indique si el dato está en metros cúbicos o en litros. Si esta pregunta no se responde entenderemos que no dispone de la información.

Tu respuesta

17. En el caso de que el hotel disponga de piscina indique el consumo de agua en 2016 en PISCINAS (en metros cúbicos o litros)

Por favor, indique si el dato está en metros cúbicos o en litros. Si esta pregunta no se responde entenderemos que no dispone de la información.

Tu respuesta

18. En el caso de que el hotel disponga de Spa o Instalaciones similares indique el consumo de agua en 2016 en SPA O INSTALACIONES SIMILARES (en metros cúbicos o litros)

Por favor, indique si el dato está en metros cúbicos o en litros. Si esta pregunta no se responde entenderemos que no dispone de la información.

Tu respuesta

19. En el caso de que el hotel disponga de lavandería propia indique el consumo de agua en 2016 en LAVANDERÍA (en metros cúbicos o litros)

Por favor, indique si el dato está en metros cúbicos o en litros. Si esta pregunta no se responde entenderemos que no dispone de la información.

Tu respuesta

20. En el caso de que el hotel disponga de jardines indique el consumo de agua en 2016 en riego de JARDINES (en metros cúbicos o litros)

Por favor, indique si el dato está en metros cúbicos o en litros. Si esta pregunta no se responde entenderemos que no dispone de la información.

Tu respuesta

21. En el caso de que el hotel disponga de Campo de Golf indique el consumo de agua en 2016 en riego de CAMPO DE GOLF (en metros cúbicos o litros)

Por favor, indique si el dato está en metros cúbicos o en litros. Si esta pregunta no se responde entenderemos que no dispone de la información.

22. Seleccione de esta lista aquellas acciones relacionadas con la gestión ambiental que se desarrollan en su hotel

- En el caso de que su hotel desarrolle alguna acción no incluida en este listado puede añadirla al final
- El hotel dispone de alguna certificación ambiental
- El hotel tiene una política o programa ambiental
- El hotel incluye información sobre sus políticas de gestión ambiental en sus campañas de marketing
- El hotel cuantifica el ahorro en costes asociado al desarrollo de medidas medioambientales
- El hotel potencia que sus empleados/as propongan alternativas de ahorro de recursos
- El hotel desarrolla acciones de sensibilización ambiental entre sus clientes
- El hotel ha instalado sistemas de ahorro de agua en cisternas, duchas, grifos,...
- El hotel ha instalado sistemas de reciclaje de agua para las cisternas
- El hotel dispone de un sistema de tratamiento de aguas residuales para su posterior reutilización
- El hotel promueve entre sus clientes el uso eficiente del agua
- El hotel dispone de sistemas de ahorro de agua en el riego de jardines
- El hotel dispone de máquinas (lavadoras, lavavajillas,...) con programas de ahorro de agua
- El hotel ha instalado en algunas máquinas (lavadoras, lavavajillas,...) sistemas de control de consumo de agua
- El hotel ha instalado en algunas máquinas (lavadoras, lavavajillas,...) sistemas de recirculación de agua
- El hotel ha seleccionado para sus jardines plantas que requieren poca agua y/o vegetación autóctona
- El hotel dispone de algún sistema de aprovechamiento de aguas pluviales
- Otro:

23. Indique su grado de acuerdo o desacuerdo con estas afirmaciones

- La adopción de medidas de ahorro de agua es una práctica cada vez más habitual en el sector hotelero
- El desarrollo de planes de ahorro de agua supone una ventaja competitiva
- Uno de los principales problemas a la hora de poner en marcha de medidas de ahorro de agua es la excesiva inversión
- Los clientes demandan cada vez más acciones relacionadas con el ahorro de agua en los hoteles
- La puesta en marcha de medidas de ahorro de agua supone una importante mejora de la marca del hotel
- La principal razón para adoptar medidas de ahorro de agua es el cumplimiento de la legislación

- La ausencia de incentivos adecuados (subvenciones, deducciones fiscales...) a la hora de desarrollar programas de ahorro de agua supone un importante impedimento
- La adopción de medidas de ahorro de agua en un hotel depende, en gran parte, de la conciencia de la dirección
- La puesta en marcha de medidas de ahorro de agua en los hoteles es fundamental en zonas de escasez de recursos hídricos
- La puesta en marcha de medidas de ahorro de agua supone, con el tiempo, un importante ahorro de costes
- Una de las dificultades de la adopción de medidas de ahorro de agua es la ausencia de profesionales/empresas con capacitación adecuada
- La adopción de medidas de ahorro de agua es una práctica cada vez más habitual en el sector hotelero
- El desarrollo de planes de ahorro de agua supone una ventaja competitiva
- Uno de los principales problemas a la hora de poner en marcha de medidas de ahorro de agua es la excesiva inversión
- Los clientes demandan cada vez más acciones relacionadas con el ahorro de agua en los hoteles
- La puesta en marcha de medidas de ahorro de agua supone una importante mejora de la marca del hotel
- La principal razón para adoptar medidas de ahorro de agua es el cumplimiento de la legislación
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- La puesta en marcha de medidas de ahorro de agua supone, con el tiempo, un importante ahorro de costes
- Una de las dificultades de la adopción de medidas de ahorro de agua es la ausencia de profesionales/empresas con capacitación adecuada

Nombre del hotel

Cumplimentar en el caso de que quiera que su empresa figure entre las empresas colaboradoras en esta investigación en la difusión de los resultados

Tu respuesta

Cuenta de correo electrónico de contacto

Cumplimentar en el caso de que quiera recibir un informe de los resultados más relevantes obtenidos de esta investigación