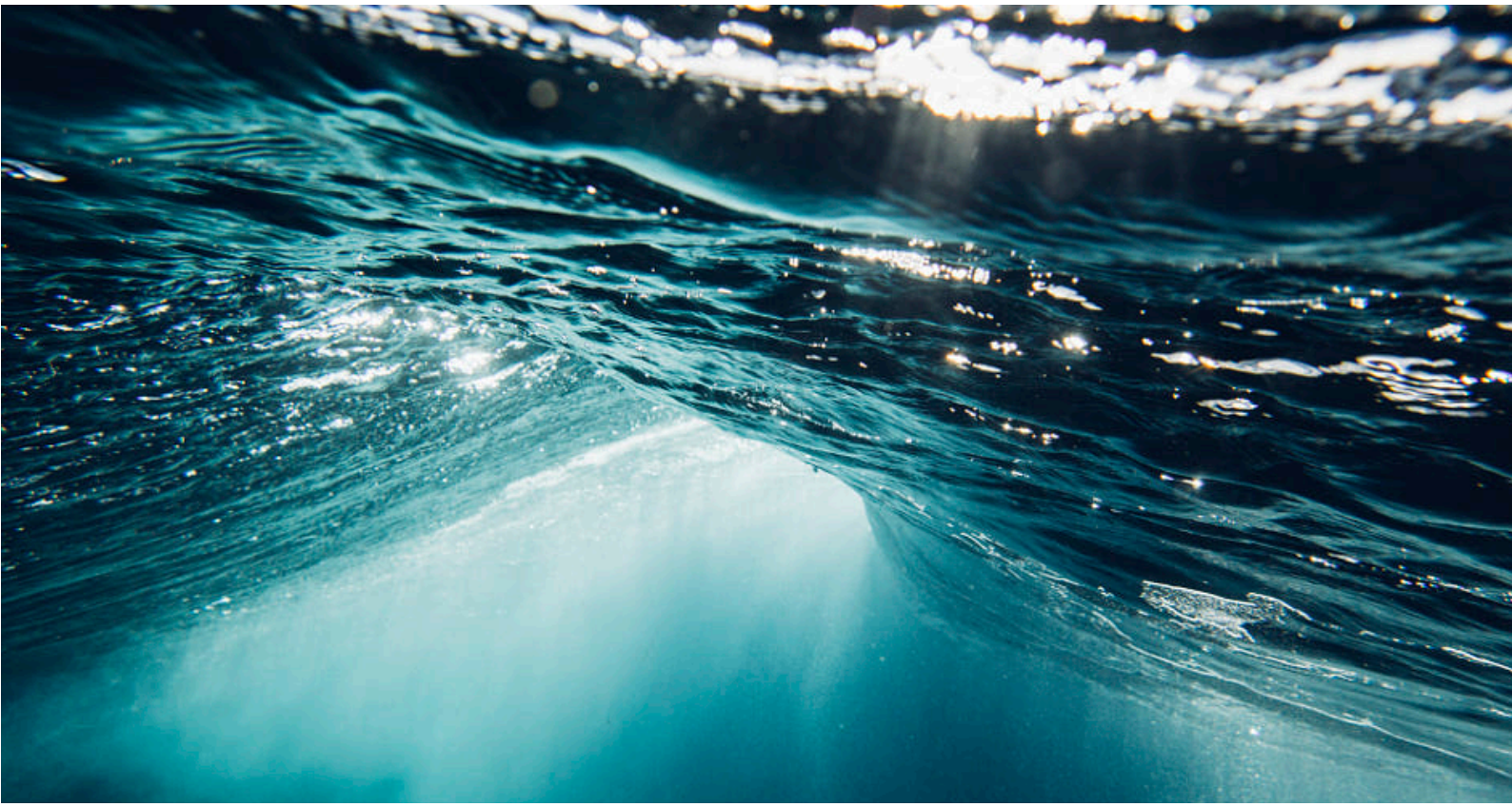
# Influential Factors on the Decision-making Process regarding Freshwater Use in the Tourism Sector

A literature study on the influential factors on the decision-making process regarding freshwater use for hotels in the European Mediterranean, compared to a case study on hotels in Rimini, Italy, through the use of the PESTEL model.

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# Abstract

The European Mediterranean is one of the most popular tourism destinations in the world, with increasing numbers of international tourist arrivals every year in many places. However, this region is also sensitive to droughts & freshwater shortages, especially in summer, which collides with its tourism high season. As tourism is a water-demanding industry, a growth in tourist numbers increases the stress on freshwater resources around the destination. Therefore, it is important to get a better understanding of how water is used in this region's tourism sector. Accommodation accounts for a large part of the total amount of freshwater used by tourists and hotels are still the most popular form of accommodation. The focus of this research is therefore on how hotels use freshwater and what factors can be influential to the decision-making process about this usage. To identify & organize these factors, the PESTEL model is used as conceptual framework. A literature study & a case study on Rimini, Italy, are conducted to get insights on water use in hotels and to see what factors were identified as influential by the existing literature and by the hotels themselves, after which the results of the two studies are compared & analysed.



Key words: European Mediterranean; water-using behaviour; hotels; PESTEL model.

# Author Statement

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# 1. Introduction

Freshwater; it is one of the few basic needs all living beings on earth need for survival. From 1960 until 2010, global water use has tripled (Carbon Disclosure Project, 2010a, as cited by Gössling et al., 2012). This has already caused water stress in many locations, which affects a large and growing share of the world's population, with an estimated 450 million people that were already living under severe water stress in 1995 (Vörösmarty, Green, Salisburyn & Lammers, 2000). Under a global climate change scenario of a 4 °C increase in the average temperature, this number could increase to 3.2 billion people by the year 2100 (Parry et al., 2009). These numbers show the urgency of water management for all of humanity.

One factor that will cause water demand to skyrocket for sure, according to Tian et al. (2015), is a rapid increase in tourist arrivals. The tourism industry is in an industry that is dependent on freshwater resources and, at the same time, is an important user of freshwater (Gössling, Peeters, Hall, Ceron, Dubois & Scott, 2012). Tourists consume water when washing themselves, when using the toilet, when participating in water-consuming activities - such as skiing or golfing, for which snowmaking and irrigation are often needed - and when using spas, wellness areas or swimming pools. Besides these active uses of freshwater by the tourists themselves, freshwater is also needed for maintaining the gardens and landscaping of accommodations and other touristic facilities and is indirectly embodied in the industry through tourism infrastructure development and food and fuel production (Chapagain & Hoekstra, 2008). So, even though its availability is often limited, freshwater is one of the natural resources that are most intensively demanded by the tourism industry, especially in coastal zones. This demand brings with it the implicit risk of over-exploitation (Gössling, 2001). The consequences of this over-exploitation, such as the lowering of the groundwater level or saltwater intrusion, can determine the living conditions in coastal areas.
These threats are even more alarming when you realize that the number of International Tourist Arrivals (ITAs) is only expected to grow, with an expected number of 1.8 billion ITAs by 2030 (World Tourism Organization, 2017).

According to the UNWTO report on Tourism Highlights (2018), 2017 counted a total of 1326 million ITAs worldwide, with Europe taking the lead with 671.7 million ITAs; 50.7% of the total number. The Mediterranean region of Europe counted 267.4 million ITAs in 2017 which is 39.8% of the total number of ITAs in Europe.
From these numbers, it can be seen that the Mediterranean region of Europe is still one of the most popular - if not the most popular - tourism destinations in the world.
The European part of this geographic area includes the Southern part of Portugal, Mediterranean areas of Spain and France, almost the entire territory of Italy and the whole extension of Slovenia, Croatia, Albania, Greece, Malta and Cyprus, as well as the British Overseas Territory of Gibraltar, Bosnia-Herzegovina and Montenegro (Climate-ADAPT EU, N.D.). See figure 1.

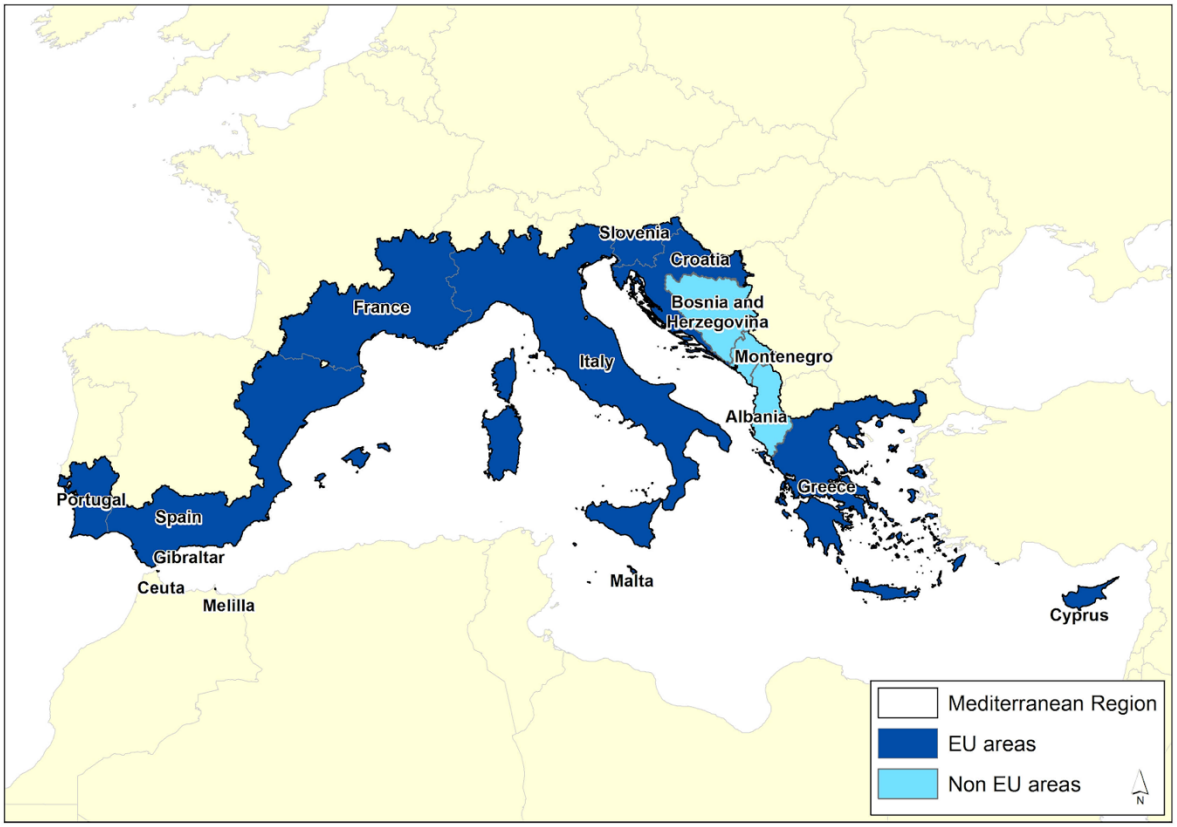


*Fig. 1: European Mediterranean Area (Source: www.climate-adapt.eea.europa.eu)*

The Mediterranean climate is known for its mild, rainy winters and its warm, dry summers, where the subtropical location combined with clear skies under descending air gives the opportunity for high temperatures to exist (Seager et al., 2019). Many parts of the region are semi-arid and struggle with water resources, especially during the long and dry summers. Seager et al. (2019) mention that, due to climate change, summers will become hotter and less rainfall can be expected during winters, which causes that droughts of unprecedented severity are increasingly likely to occur in the future, especially during the summer season. Toth, Bragalli & Neri (2018) mention that in Mediterranean regions that are affected by water scarcity conditions, the gap between freshwater demand and freshwater availability is expected to increase further in the near future because of both climatic and anthropogenic drivers.

One of the clusters demanding a fair share of water in many Mediterranean regions is the tourism sector. Tourism in many parts of the Mediterranean is highly concentrated, both seasonally and spatially, with the majority of the visits occurring in coastal towns during the summer months - May until September (Mancini et al., 2017). While tourism undoubtedly represents an important source of revenue and employment in the Mediterranean area, it also causes noticeable impacts on society (Coldwell, 2017) and on the environment (Mancini et al., 2017). Tortella & Tirado (2011) mention that one negative environmental effect is the excessive consumption of freshwater which can put severe stress on freshwater resources. Tourism development has stressed the balance between the availability of freshwater and its demand, putting severe stress on freshwater resources and generating situations of scarcity that might be worsened by the effects of climate change (Villar-Navascués & Pérez-Morales,

2018). Gössling (2001) mentions that especially coastlines have been exposed to this tourism infrastructure development and, with that, large numbers of tourists visiting. This has often had a negative impact on the sustainable use of the available natural resources, which has negative effects for the integrity of the coastal ecosystems, while these often are already vulnerable (Belle & Bramwell, 2005).

According to Toth et al. (2018), tourism can add considerable pressure on available water supplies in coastal regions, especially because of the concentration in time and space of tourists and of specific water-demanding touristic activities. Toth et al. (2018) go on to mention that the tourism industry demands water for both indoor and outdoor activities. Examples of indoor activities are showers and other personal hygiene practices, while irrigation for a garden, car and street washing or swimming pool use are examples of water-demanding outdoor activities. According to Tortella & Tirado (2011), this water demand can generate serious problems of overexploitation or depletion, especially in regions where freshwater resources are already scarce, as occurs in most coastal destinations such as the Mediterranean, where a large part of the world tourism is concentrated. These destinations are normally characterized by warm weather, periodic droughts and little rainfall, especially during the summer which is often the touristic high season (Tortella & Tirado, 2011). This leads to a combination of a maximum demand and a minimum availability of freshwater in this period of year (Toth et al., 2018).

With climate change increasing temperatures globally and droughts in many regions, such as in the Mediterranean, the resilience of many ecosystems will likely be exceeded, altering their structure and function, according to Peñuelas et al. (2016). Because of an increase in temperatures there will be an increase in evapotranspiration, which will then lead to freshwater losses (Morote et al., 2017) and the increase of droughts and aridity of the land. This chain reaction connects to more natural disturbances, such as floods, extreme weather, heatwaves and forest fires. So, the natural processes that are dependent on temperature and on water availability are very likely to be affected by climate change (Peñuelas et al., 2016). The entire Mediterranean region, according to results of 2015 from the Global Footprint Network, is already using approximately 2.5 times more natural resources and ecological services than its ecosystem can provide. This also includes the use of freshwater. Gössling et al. (2012) explain that if climate change and water scarcity scenarios in the Mediterranean become reality, meeting the water needs of the tourists and also of the local residents could become a challenge. Outdoor uses that are critical for tourism, such as swimming pools and water parks, could be threatened.

## 1.1 Scholarly Relevance & Research Questions

According to Mancini et al. (2017), the Mediterranean region still misses common methods and infrastructure to manage and measure the overall effects of tourism on the region. The consequence is that the degree of knowledge and capacity on addressing and diminishing the negative impacts tourism has, differs broadly across destinations. There is no consistently understood baseline of acceptable performance (Drumm et al., 2016, as cited by Mancini et al., 2017).
Because the contribution of tourism to water consumption is expected to increase due to the rise in ITA's, the rise in hotel standards and a rise in water demand in various tourism activities (Gössling et al., 2012), a better understanding of how water managers and policy

makers can influence water use in the tourism sector is needed to be able to reduce the negative effects of tourism (development) on already vulnerable areas where water-dependent residential sprawl has become widespread (Morote, Saurí & Hernández, 2017). To know on which factors water managers need to focus if they want to adjust the water use of hotels in the tourism industry, such as hotels, they need to find out what factors are the most influential on the decision-making processes of these stakeholders when it comes to their water use.

This realization leads to the following research question:

- *What factors influence the decision-making of hotels regarding water use in Mediterranean destinations with high tourism numbers and a limited availability of freshwater?*

To help answer this question, the model of PESTEL will be used as a conceptual model. This model is mostly used in the domain of strategic management, HR and marketing and its analysis can be used for strategic decision making (Ruziwa, 2015). Its name contains the factors that it will analyse, and stands for political, economic, socio-cultural, technological, ecological and legal. For this research, the PESTEL model provides a frame to start from, with certain factors that could be influential on water use of hotels.
To find an answer to the research question, several steps will be taken; a literature study will be used to determine the PESTEL factors and possibly other influential factors that are already known and to adjust this model to fit the issue of water use in the (Mediterranean) tourism industry. A case study in Rimini, Italy will be conducted to get this information directly from the field itself, after which the results of the both studies will be compared.

To help answer the research question in and to give structure to this research, several secondary research questions are added:

- *What is freshwater used for in the tourism industry and in hotels specifically?*
- *What influence do the clusters of the PESTEL model have on the decision-making process of water-use in hotels and how do they interact?*
- *Are there other factors having an influence on the decision-making process of water-use in hotels and how do they interact?*
- *What are the similarities and differences between the results of the literature study and of the case study?*

## 1.2 Report Structure

This report is organized as follows; first, the conceptual model will be analysed and explained, after which the methods are discussed. Then, the outcomes of the literature study will be presented in the results. When the factors are analysed, the results of the case study in Rimini, Italy will be analysed, after which the results of both studies will be compared and their similarities and differences are identified. The report concludes with a discussion and conclusion, to summarize the findings of the research and answer the research question, to give a suggestion where further research is needed, and to reflect on the research process.

# 2. Conceptual Framework

There is a growing need to come up with a good approach to resource management that supports economic development without harmful consequences for the environment through the viewing of environmental management protection and economic growth as one continuous process, representing multiple different scientific disciplines (Lal, Lim-Applegate & Scoccimarro, 2002). Lal et al. (2002) go on to explain that there is also the need to create a process for implementing and formulating an action plan that will take social, political, institutional and economic factors into account. The realization that these needs are there has caused a shift in the resource use and management templates, where incorporated approaches to the management of natural resources have been proposed in many fields. Examples are ecosystem management, coastal zone management and ocean management. In their article, Lal et al. (2002) use the term Integrated Natural Resource Management (INRM) to include and describe all these integrated approaches. These INRM approaches are effective for managing the complex resource issues that are currently faced by many countries. According to Lal et al., these approaches focus on finding ways to manage the sustaining of the stockpiles of natural resource and the stream of goods and services while also taking their underlying ecological processes into account. However, INRM does not yet have a systematic methodology. There are only certain elements outlined that are integral to the process, which are that the approach should include various disciplines, should be spread out over spatial and temporal scales, and should let multiple stakeholders be involved in the planning and implementation process (Lat et al., 2002).
Lal et al. (2002) argue that INRM should be considered to be a repetitive but also adaptive process for decision-making which is guided by constructivist philosophy. Decision makers are encouraged to make dialectic choices – that is ensuring a full consideration of alternatives – based on the different strategies that are focusing on people's behaviour and how to change it in order to achieve certain outcomes, instead of simply relying on the particular inputs that are required in traditional resource management. According to Lal et al. (2002), the adaptive decision-making process (ADMP) is build up by four phases, which are subsystem identification, reflection, action and adaptive learning. The boundaries between the phases are flexible. Also, multiple phases could be undertaken at once. See figure 2.

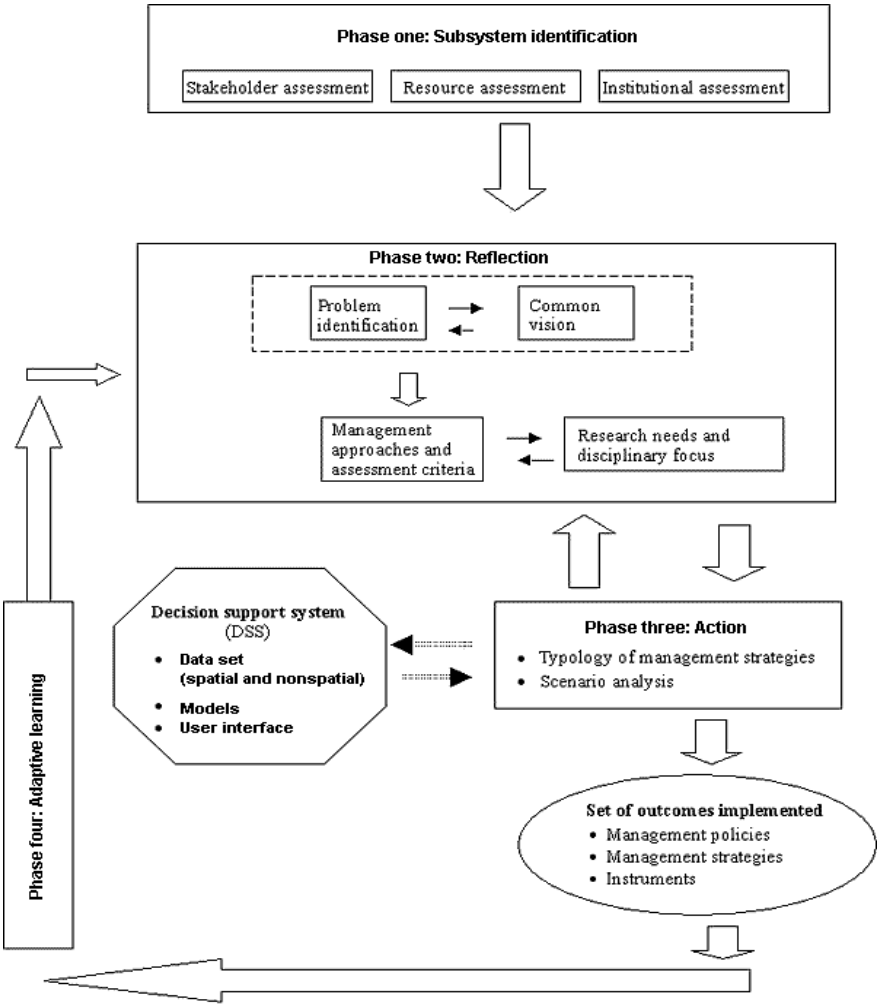


*Fig. 2: The adaptive decision-making process (ADMP). (Source: Lal et al., 2002).*

According to Lal et al. (2002), reasonable, stakeholder-based decision making is a theme inherent in the process of adaptive decision-making. It assumes that there are many different interpretations of the problem and, as a result, many realities are possible. Decisions are based on the knowledge of all the stakeholders and are achieved through interactions between them. This makes sense when you agree with the notion of King & Lawley (2016) that organizations are not sealed from their environment; they interact with, and are affected by, other stakeholders, activities and situations going on around them. In the tourism industry, for example, organizations such as hotels or amusement parks are influencing – and are being influenced by – factors outside of their own organization, such as their competitors and customers.

Ruziwa (2015) mentions that it is necessary for organizations and companies to analyse their environment, which will help them to make more effective and strategic decisions in the future. Besides this, organizations that systematically do analyses of their environment on a regular basis have a competitive advantage over their competitors, as they can more easily spot trends.

In their book, King & Lawley use a model that can help to analyse the environment and the different factors – and their influences – that it is made up off; the PEST model. This model splits the environment into four different clusters; a “political”, an “economic”, a “social” and a “technological” cluster. This PEST model can also be extended to a PESTEL model. In this case, a “legal” and an “environment” cluster are added to the clusters in which the

environment of the organization is split. As Issa & Chang (2010) also explain, the PESTEL model analyses the external business environment of the organization to understand the bigger picture and network in which the organization operates. This analysis enables the organization to identify and take advantage of their opportunities while minimizing the threats that they are facing.
These characteristics give the impression that it is a suitable model to use as a base for a decision-making process, which will be tested in this paper. See figure 3 below for an example of a PESTEL model, developed by Yüksel (2012).

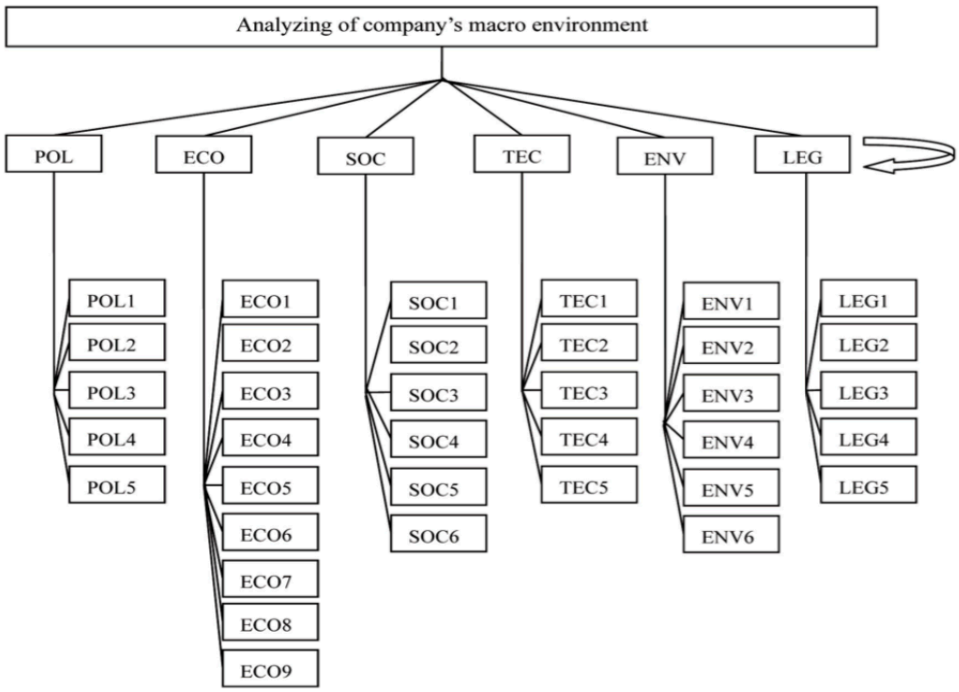


*Fig. 3: The hierarchical model of PESTEL (Source: Yüksel, 2012).*

In the model above, the six different clusters of the environment can be seen. Below these clusters, different factors of the specific cluster can be mentioned (POL1 and POL2 for political factors, etc.) that all have an influence on the organization and on its decision-making processes Examples can be "increased awareness of sustainability" as a socio-cultural sub-factor, or "international treaties" as a legal sub-factor.

Below (figure 4), you will find a conceptual model, based on the model by Yüksel (2012), that was adjusted to fit the research question of this research. The term "Environment" was translated to "Ecological" to prevent any confusion with regards to the other term "environment" used to address the business environment of the organization. In the results, I will come back to this model and will adjust it to the results from the literature and the case study.

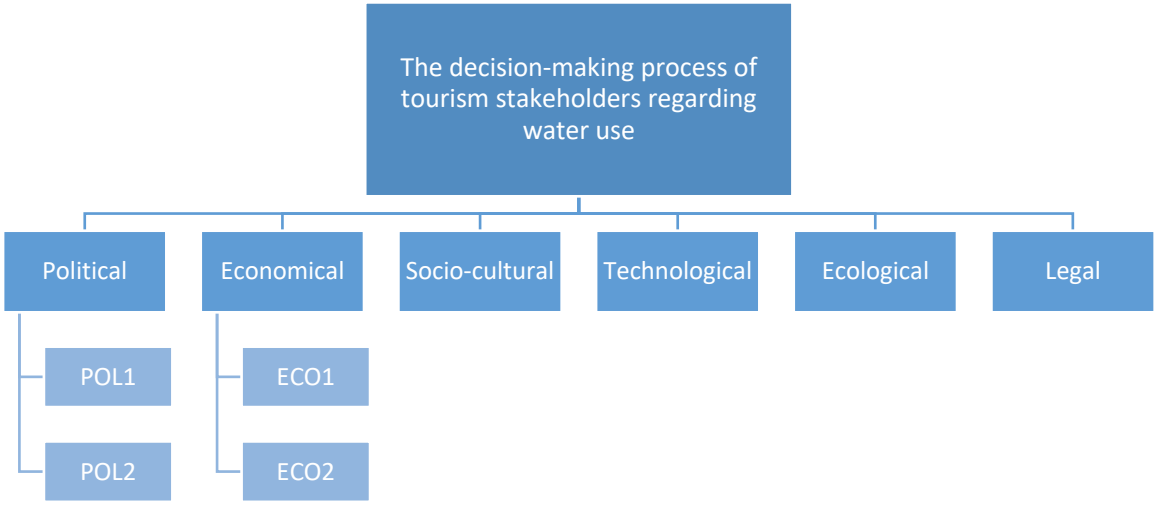


*Fig. 4: The hierarchical model of PESTEL incorporated in a decision-making model.*

Now that the different clusters that can possibly be influential to the decision-making process about water use are identified, it is time to explore these factors further.
First, let us take a look at the *Political* factors. The question that this cluster asks and tries to answer is; "what seems to be happening politically in the environment in which you operate or expect to operate?" (Ruziwa, 2015). This cluster is about government regulations that organizations must obey to (Issa & Chang, 2010), how and to what degree the government intervenes with certain industries or even businesses, and the factors are basically the influences that the government has on your business (Business-to-you, 2016). Examples can be certain government policies, political stability or instability, corruption, taxes, subsidies or the labour law. Furthermore, the government might also have a significant impact on infrastructure, the nation's system of education and on certain health regulations (Business-to-you, 2016). These are all factors that need to be analysed and potentially taken into account when making decisions as a private company.

Second, the *Economic* factors are analysed. This cluster is concerned with any cost-related matters for the stakeholders (Witcher & Chau, 2010, as cited by Issa & Chang, 2010). These factors are determinants of a certain economy's performance (Business-to-you, 2016). The question that this cluster asks and tries to solve is; "what is happening within the economy?" To answer this question, this cluster can help by providing information about the different economic factors, such as economic growth or decline, interest rates, exchange rates, wage rates and minimum wage, working hours etc. (Ruziwa, 2015). According to the website Business-to-you (2016), these economic factors may, directly or indirectly, have a long-term impact on a company, because it affects the purchasing power of consumers and could possibly affect the demand and supply models within the economy. As a consequence, these factors also affect the decisions companies make about the way they price their products and services.

Third, the *Socio-cultural* factors. This cluster represents cultural factors like trends, norms and values of the target population, consumer awareness & attitudes (Issa & Chang, 2010), safety emphasis, health consciousness, lifestyle attitudes and cultural hindrance (Business-to-you, 2016). It also contains demographic factors, such as age distribution, population growth rate etcetera (Business-to-you, 2016). The main question here is "what is occurring in the society

of the markets in which you operate or expect to operate?" (Ruziwa, 2015). So, basically, one could analyse the social pressure – whether coming from other stakeholders or from external factors – that is experienced by the organization.

Fourth, we look at the *Technological* factors. This cluster contains the technological developments that can impact the operations of the industry (Ruziwa, 2015) by, for example, causing a need for organizations to invest in innovations in the technology they use. This cluster refers to technology incentives, research and development activity, the degree of innovation, automation and the level of technical knowledge and awareness that the market possesses (Business-to-you, 2016). Technology is always developing and things that were not possible only a few years ago are now mainstream. For organizations it can be important to keep up with these technologies to attract customers that might be dependent on technology, for example tourists visiting for business purposes.

The fifth cluster contains *Ecological* factors. According to Business-to-you (2016), this cluster and its factors have just recently gotten more attention; ecological factors cannot longer be ignored due to the increasing threat to natural resources and to the targets set by governments on pollution and their carbon footprint. With a growing sensitivity towards environmental issues, companies are more and more expected to take responsibility for their ecological footprint and to invest in sustainable development (Issa & Chang, 2010). Defining this responsibility, however, shows to be a challenge as companies search for ways to balance their economic, social and now environmental performance (Issa & Chang, 2010). The main question that one could ask here is; what is happening with respect to ecological and environmental issues that will influence stakeholders' decisions? (Ruziwa, 2015). The factors within this cluster are ecological and environmental aspects such as the weather and the environmental effects of climate change, which can affect industries such as the tourism, agriculture or insurance industry (Business-to-you, 2016). This cluster can give clarity about if the organization cares about the effects of their decisions and actions on the local or global environment. Some companies can consider Corporate Social Responsibility (CSR) for making ethical decisions, both with regards to society and to the environment. Increasing attention by the press, campaign groups and public awareness have led to firms being pressured to respond to, and take a stand on, topics such as sweatshop labour and environmental pollution to protect their own reputation and brand image. This is called CSR, and it is increasingly important for companies to consider when making decisions (King & Lawley, 2016).

The sixth and final cluster is dedicated to *Legal* factors. These factors can sometimes overlap with the political factors, but besides policies they also include specific laws, such as employment laws, consumer protection laws and health and safety laws (Business-to-you, 2016). Companies need to be aware of what the rules and laws of their environment are that they have to obey to. These laws are especially interesting when it comes to water use in destinations that are dealing with droughts and high tourism numbers. Legal factors can have an impact on topics such as access to materials and resources, employment and taxation.

The reason that this PESTEL model is chosen to help answer the research question is that it provides a clear framework that makes it easier to take many possible influential factors into account when analysing the decision-making process of stakeholders. It is also a model that

can easily be adjusted when extra influential factors show up. Therefore, this model will mostly be used as a guideline for identifying influential factors and for making sure we are not overlooking any cluster. Using this model will therefore not mean that extra clusters that come out of the literature or the case study will be ignored; they will be taken into account and analysed, and if relevant added to the model.

# 3. Methodology

## 3.1 The Literature Study

To try to answer the research question and the secondary research questions, several steps were taken. First of all, the existing literature on water use in tourism, on decision-making in tourism and on climate in the European Mediterranean was examined in an in-depth literature review. The focus of this research is the European Mediterranean region, so I have tried to find literature that is specifically about this area. However, when I came across an article about another, similar destination with relevant information, then this was used as well. For the literature review, the articles were selected based on the following word combinations mentioned in either their title, keywords or abstract:

- Water-use in tourism
- Decision-making model
- PESTEL model
- Political *(or economic / socio-cultural / technological / ecological / legal)* influences water use tourism
- Urbanization and water use
- Mediterranean climate
- Effect tourism in Mediterranean

To find relevant information on topics that require a more recent analysis, the filter "since 2015" was often used to find the most relevant literature on the topic. With some other topics that did not necessarily require the most recent information, this filter was not used. The second most used approach to finding relevant literature was scanning the references of articles that already turned out to be useful for more relevant literature often zooming in on particular topics. This brought up more complete information on certain topics that gave better insights and structure. With this technique, the most recent information possible was used.
The literature was searched for specific information that explains about the development of the Mediterranean climate, the tourism industry in this region, water use in the tourism industry, decision-making – if possible, regarding this water use, the effect of the PESTEL factors on water use and other factors that could be influential on the water use.
Once these different factors were identified, the conceptual model could be expanded to fit the decision-making about water use in the tourism industry and the factors influential in that process.

## 3.2 The Case Study

The second step was to conduct a case study, which would be on a popular, seasonal-bound tourism destination in the European Mediterranean that experiences or has experienced stress on its freshwater supply combined with high tourism numbers. The goal of this case study was to get direct information from the hotels themselves, after which the results of both studies could be compared. The location chosen for this case study was the Italian coastal town of Rimini. Rimini is a coastal town located on the East coast of Italy, around 180 kilometres south of Venice (see figure 5). It is the capital of the municipality Rimini, which is located in the province of Emilia-Romagna. The Emilia Romagna Region (ERR) is located in the northeast area of Italy and borders the Adriatic Sea. The climate at the coast is warm and

mild, not necessarily dry, with a yearly rainfall of between 550 and 750 mm and a mean annual temperature which lies between 12 and 14°C (Toth et al., 2018).
The watercourses in the ERR are heavily altered bodies of water, which is the result of centuries of intensive investment to shift natural water flows and drain swamps for the purpose of agricultural and urban developments, which already started around the twelfth century (Pérez-Blanco, Standardi, Mysiak, Parrado & Gutiérrez-Martín, 2016).
Water use in the ERR has increased over the last 50 years, and the demand exceeds average water availability. The fact that this demand is mismanagement becomes especially evident during the irregular periods of abnormal drought. The frequency of these periods occurring has been increasing since the beginning of this century (Mysiak et al., 2014, as cited by Pérez-Blanco et al., 2016). In these periods, market uses of water, particularly from agriculture but in some parts also from tourism, become competitive with environmental services (Pérez-Blanco., 2016).

Rimini is considered a middle-sized city with approximately 130,000 residents. The city has an average income per capita which is higher than the Italian average (Figini & Vici, 2012). The tourism industry is one of the main economic sectors in the city. In 2012, together with its province, it hosted a total of close to 16 million overnight stays, of which 12 million took place within the main town of Rimini (Figini & Vici, 2012). In figure 5, you can see that in the area portrayed, the municipality of Rimini has one of the highest numbers of tourist arrivals in the region, between 747778 and 1598158 (Drius et al., 2019).

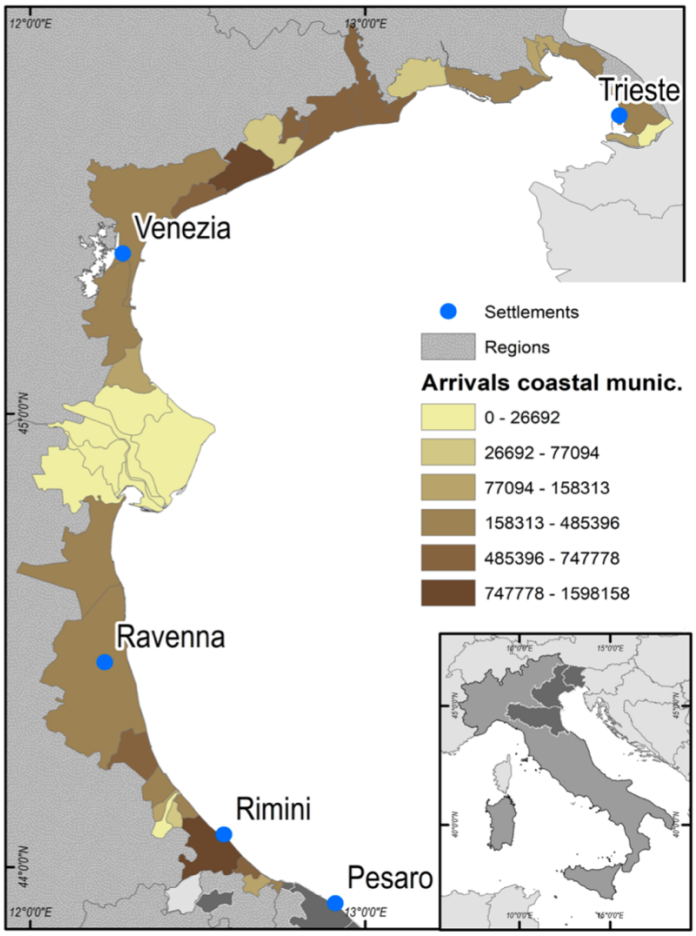


*Fig. 5: "Case study area in the Italian Northern Adriatic Sea (NAS) and arrivals per year by coastal municipality" (Source: Drius et al., 2019).*

At this destination, I interviewed hotels and experts on the topic of water use in Italy and Rimini. The sample of hotels that was interviewed consisted of 3- and 4-star hotels. There are several reasons for this. First of all, the group of 1- and 5-star hotels in the municipality of Rimini is limited with only around thirty-six 1-star hotels, and two 5-star hotels (Booking.com, 2019). Secondly, all 2-star and 5-star hotels that were asked to participate either refused or told me to contact them via email, after which they failed to reply. However, of the total of around 1.044 hotels in the municipality of Rimini, the number of 3-star hotels in the municipality of Rimini is 594, and the number of 4-star hotels is 86 (Booking.com, 2019). This left me with still 680 hotels that could be represented by the data that were collected.

For this research, in-depth, semi-structured, in-person interviews, expert interviews and structured in-person interviews were conducted. Three semi-structured, in-depth, in-person interviews of all over 30 minutes and nine shorter, structured in-person interviews, which were all around 10-15 minutes, were conducted. Before starting with the interview, the reason of the questions and the research topic was explained. During the interview with the hotels, the first few questions were about the hotel itself. These were questions of which the answers would not give the possibility to expose which exact facility was being interviewed, but they were asked to determine what "kind" of hotel the data was coming from and to be able to draw conclusions based on the actual type of hotel. After this introduction, the PESTEL model was explained and examples were given of the effect of the different factors on the decision-making about water use in the tourism sector. After this explanation, the spokesperson of the hotel giving the interview was asked if he or she would recognize any of these examples, what the importance of each factor was for the decision-making process about the hotel's water use, and if there were other factors playing a role in this, not included in the PESTEL model.

After arriving at the destination, I first met with Dr. Toth and Dr. Bragalli – two hydraulic experts from the University of Bologna, School of Engineering – to discuss my research proposal and to get a better understanding of how the water system works in Italy and in the Rimini area. This was extremely useful as they gave me relevant background information on the case I was studying. They provided information about where the water comes from and how it is distributed. They also arranged an interview with HERA S.p.A. - the local water distributor - for me, to get even more information on the water distribution system in Rimini.

In the following days, different stakeholders in the tourism industry, mostly hotels and water parks, were approached via email and telephone to see if they were willing to participate in the research through interviews. After these first attempts to arrange an interview, many more hotels were visited to be able to explain the purpose of the interview in person, and to ask them to participate. No hotel was able to give a long interview on the spot, so five scenarios could occur. They either had a few minutes of time in which I could conduct a structured (short) interview; They made an appointment for me to come back another time; they gave me a business card of the hotel and told me to email them; they asked me to leave my information and phone number behind so they could call me; or they told me they were not interested in participating. Of the 39 hotels that were approached, twelve were willing and available to provide an interview, of which three were long, semi-structured interviews.

# 4. Results

In this section, the results of the literature study and the case study will be presented. First, water use in the tourism sector will be analysed and explained in depth, to give a better understanding of the industry and the situation regarding freshwater use and demand. After this, the results of the literature study with regards to the influential factors on the decision-making process regarding water use will be presented, after which other, external factors will be mentioned. Subsequently, the results of the case study will be presented, after which similarities and differences between the results of the literature study and the case study will be mentioned and analysed.

If you want to know what factors influence the decisions about water that are being made by tourism stakeholders, you first need to understand what decisions about water need to be made. To determine this, we will take a look at the first secondary research question; *Where is freshwater used for in the tourism industry and in hotels specifically?*

The tourism industry demands freshwater, both directly and indirectly because of its strong linkages with other sectors (Tian et al., 2015), for both indoor and outdoor activities. (Toth et al., 2018). Examples of direct water demand through indoor activities can be showers, baths and other personal hygiene practices, but also a laundry service in the hotel. According to Gössling et al. (2012), examples of direct freshwater use through outdoor activities can be a swimming pool, a water park, an artificial ski slope, a golf course or a garden that needs irrigation. Examples of indirect water demand can be for the production of food where water is needed, for transportation and for infrastructure. Tian et al. (2015) state that the indirect water consumption caused by tourism is even more significant than the direct water consumption. Below, you will find a table which shows the amount of water used by a tourist per day in different – direct and indirect – categories.

| Water Use Category | Indicator | Min-Max in L/Guest Night | Estimated Average L/Guest Night |
|---|---|---|---|
| Direct water use | Accommodation | 84–2425 | 350 |
| | Activities | 10–875 | 20 |
| Indirect water use | Infrastructure | 0.2 | 0.2 |
| | Fossil fuels for transport | 5–2500 | 130 |
| | Energy use at hotel | 0.3–200 | 75 |
| | Biofuels | 2500 | - |
| | Food | 4500–8000 | 6000 |
| | Other consumption | n.a. | n.a. |
| Total | Total | 4600–12,000 | 6575 |

*Table 1: Water use categories and estimated use per tourist per day (Source: Gössling et al., 2012, 2015 [10,21]. The data from the two different papers was gathered and bundled for each category by Tian et al., 2015).*

As you can see in the table above, when it comes to the direct water use, the accommodation is by far the biggest consumer. This is therefore also the focus of this research. First, we have analysed the differences in water use between different types of accommodation. Later, we

zoom more in on hotels and their water-use, the decisions they make and the factors that influence this. According to Belle and Bramwell (2005), there are many factors that influence our response to environmental problems, such as a freshwater shortage, that could negatively affect our lifestyles and our quality of life.

## 4.1 The Type of Accommodation & its Water Use

In the European Mediterranean, there are many different types of accommodation available to tourists. The type of accommodation can have an impact on the type of water use and the amount of freshwater used. In many tourism destinations in Spain, tourists are spread over high-density urban areas – characterized by hotels – and low-density urban areas – characterized by rental villas & bungalows (Hof and Blázquez, 2013). According to Vidal, Domene & Saurí (2011), in per capita terms, less water is being consumed in high-density urban areas than in low-density urban areas. Gabarda-Mallorquí, Garcia & Ribas (2016) also confirm this by stating that mass tourism resorts have been shown to use their available water resources more efficiently than other low-density forms of accommodation. Hof and Blázquez (2013) explain this further by mentioning that the increase in low-density housing increases the number of accompanied gardens, private swimming pools and public or semi-public green areas such as verges between roads, parks, golf courses and other types of green recreation sites. According to Hof & Blázquez (2013), these factors threaten, among other things, the freshwater supply system of entire metropolitan regions, they reinforce conflicts among end-users, and they intensify the region's vulnerability to the effects of climate change. According to Gössling (2015), these water-dependent elements such as lawns, gardens and swimming pools begin to shape urban landscapes more and more. These elements are often also of importance for tourism. It has already been suggested that the annual water consumption per swimming pool could be used as an indicator to monitor the water demand of tourism (Gössling et al., 2012). According to Morote et al. (2017), in Spain, the number of single-family houses that own a swimming pool is 4.6%. This number increases considerably on a more regional level in low-density areas. These areas contain 14.5% of the total amount of swimming pools in the country (Morote et al., 2017). According to Burriel (2008, as cited by Morote et al., 2017), the pool development in certain area of Spain is intimately related to the spread of urbanization linked to residential tourism.
Because of these effects of tourism, it is important to be aware of new ways in which water is being used that emerge from the expanding tourism areas, especially when freshwater might be scarce or highly demanded by other uses such as irrigation in agriculture. Both of these other uses are relatively common in the European Mediterranean, especially in summer (Cole, 2014).

When it comes to accommodation, Tortella & Tirado (2011) state that hotels are still the most popular option for tourists. These types of accommodation are displaying high levels of water consumption, such as through swimming pools and showers. For this reason, this research focused solely on the water-use of hotels.
As is demonstrated table 1, the amount of water used per tourist in the accommodation can range between 84 L and 2425 L per overnight stay. This is a wide range, partly accounted for by the type of accommodation. However, the determining of the actual water use for just one type of accommodation, in this case hotels, is difficult according to Deng and Burnett (2002). They mention several reasons for this. First of all, a hotel building uses freshwater for many different facilities and functions such as in the guestrooms, for the pool, for the garden, in the

restaurant, etcetera. According to Tortella & Tirado (2011), facilities such as jacuzzies, hydro-massage showers and Turkish baths, which can often be found in hotel spas, require considerable amounts of freshwater for operation. Besides this, in the Mediterranean destination of Mallorca, there is a strong correlation between the presence of a golf course and the annual freshwater consumption in hotels (Tortella & Tirado, 2011). This shows that there are many different water-using facilities within hotels, and that hotels can differ significantly in their water use depending on which of these facilities they own.
Secondly, the occupancy levels of an hotel can vary significantly within a year, especially for hotels that are in season-bound destinations. Many destinations in the European Mediterranean are season-bound, with their high season taking place in summer (Gabarda-Mallorquí et al., 2017).
Third, when a hotel contains a restaurant, this facility is often open for both guests of the hotel and the general public, which means that the occupancy level of the hotel may not give a trustworthy prediction of the amount of food consumed and the amount of water needed to produce it. Besides this, the amount of water used in a restaurant's kitchen may also depend on the type of cuisine served. For example, Deng & Burnett (2002) mention that a Chinese kitchen would normally use a higher amount of water than a Western kitchen to produce the same amount of food.
The fourth reason why determining the actual water use in hotels is difficult is because of the laundry service. The presence of a laundry service significantly affects the total water use of a hotel, but hotels that do not have a laundry service in the hotel also need to wash their bedsheets and towels. These hotels will often outsource their laundry service to another company. The water used to do the laundry is then not used inside the hotel or even by the hotel, but it is still used *because of* the hotel and should be taken into account when determining the water use of a hotel. In short, these four reasons make the evaluation of water consumption performance in hotels complicated.
Deng & Burnett (2002) recommend that water use in the different end-uses (guestrooms, swimming pool, laundry service etcetera) should be separately monitored and recorded, instead of throwing all different end-uses together when analysing the water use. According to them, this will better facilitate the analysis of the water use performance in a hotel. They give the example that if the monthly total water use by the kitchen is analysed separately instead of using the total water use of the hotel, a stronger correlation may be obtained. However, they admit that having separate metering provisions for all different end-uses will bring in a large amount of extra costs.

## 4.2 PESTEL Influences

The next section tries to find an answer to the second secondary research question; *"What influence do the clusters of the PESTEL model have on the decision-making process of water-use in hotels and how do they interact?"* The 6 different clusters of the PESTEL model will be analysed in the literature for their influence on the decision-making process of water-use for hotels.
Some influential factors on water use are easy to take into consideration. For example, the fact that more water will be consumed in the hotel when there are more guests present is evident (Deng & Burnett, 2012). However, there are also factors that have an influence on the water use but that are easily overlooked. Some of these factors can be divided under the six clusters of the PESTEL model we discussed previously, while there may also be others that do not fall into any one of these six categories. We will now examine the available literature for

influential factors and see if we can (re)shape the PESTEL model to better fit the issue of water use in the tourism industry.

### 4.2.1 Political Factors

This cluster looks at in which ways the government or municipality intervenes with water use in hotels, and what other political factors there are that influence the way hotels make decisions about their water use. Examples of direct influence by the government are policies, laws, subsidies and taxes. Examples of indirect influence by the government are political stability or instability, corruption, an impact on the infrastructure and health regulations (Business-to-you, 2016).

According to Belle and Bramwell (2005), **policies** that are related to issues regarding climate change and tourism depend on decisions that have to be made in a context of uncertainty about consequences and future development, and of complex socio-economic, cultural and political relationships. They also mention that policy makers see increasing public awareness, for example through awareness campaigns, as the most appropriate policy response, which connects to the socio-cultural cluster.
According to Budeanu (2007), the government or municipality should **rationalize available resources** more efficiently for a better distribution of them over the stakeholders. She also mentions that the most common way governments or municipalities can influence choices and behaviour of tourists is through informative tools, which can eco-labels or awareness campaigns. Awareness, as will be explained further under the socio-cultural cluster, is an important factor in decision-making processes (Belle & Bramwell, 2005). Awareness campaigns can therefore be extremely useful to adjust people's behaviour. Hotels can play a role in such campaigns, for example by informing their guests and adjusting their own practices to set an example.

Gleick (1998) explains that, in the past, the focus of water development policies was on icreasing the availability of freshwater to meet the (growing) demand, and that considerations of basic human needs, the ecological water requirements and the needs of future generations were previously excluded from these policies. This focus on the supply side of water led to a neglection of the actual water use and its environmental impacts, which, in turn, led to the development of many inefficient technologies and to ecological impacts with sometimes devastating consequences (Gleick, 1998). This mis-management of water in the past also goes up for the European Mediterranean; Arbués & Villanúa (2006) explain that in Spain, the urban water needs are likely to surpass the water availability from sources that are easily accessible and that the authorities that manage the urban water supply normally put the focus of the response to this problem on supply-side policies; they prefer to increase the existing supply through the exploitation of new freshwater sources, which is becoming more and more costly. However, recently, the view has shifted towards demand-oriented solutions as a complement to, or even substitute of, the traditional supply-side measures. According to Gleick (1998), some analysts are deconstructing the demand for freshwater to be able to better identify the actual needs better and the least damaging and most efficient ways of meeting those needs. Arbués & Villanúa (2006) continue to explain that the essence of this "**managing of demand**" is that consumers are stimulated to take into account the actual value of water in relation to its availability through the promotion of rational use of water. So, basically, consumers are required to treat water as a scarce good. According to them, the

success of this demand-oriented approach depends on whether the demand is price-responsive. Will consumers choose to consume less if they have to pay more? This question shows that this factor is also connected to the economic and socio-cultural clusters. Nevertheless, this topic of increasing the price of freshwater is sensitive, as freshwater is a basic need for humans and increasing the price of such goods can sometimes result in protests. An example of this was the 30% increase in the price of water in Singapore in 2017, which led to a protest in the country (Ungku, 2017). Policies that contain this demand-orientation need to take possible responses like this into account.
So, how is this demand management related to the hotels themselves? Hotels, as we know, demand a significant amount of freshwater for daily operation. If there are policies implemented by the government or municipality that focus on the demand side and which purpose is to reduce the amount of water demanded and used, it is very likely that hotels will experience the effects of these policies way more than if the policies regarding water are focused on the supply side, which they are not part of.
According to Gleick (1998), criteria for sustainability must provide guidance for institutions that have the task to resolve conflicts over water and deal with the risks and uncertainties in decision-making processes. It must also apply to water-resource management, especially to make sure there is a democratic representation of all parties affected in the decision-making process, that the information on the resources is open and accessible, and that there are options for allocating the freshwater resources. To this day, information and data about water resources and water use is not available everywhere in the world, even in developed countries (Gleick, 1998). This makes it even harder for stakeholders such as the actual end users, environmental groups and academics to influence water planning and decision-making, as they already have significantly less power than the narrow range of professionals trained in agriculture, engineering and hydrological sciences that the water management is limited to (Gleick, 1998). This indicates that even though hotels will feel the influence of demand management on their way of using water, they will still not actually receive more influence themselves.

### 4.2.2 Economic Factors

Besides the political, social, moral and ethical arguments for hotel operators to pay attention to good environmental practices, there are also economic arguments
When it comes to economic factors related to water use in the hotel, the first factor you think about is the cost of the water; its price. If water is considered as an economic good that has an economic value, the pricing of the water becomes an important issue, especially for demand management, as explained under the political factors.

In Spain, according to Angulo et al. (2014), the economic importance of tourism for the country's Gross Domestic Product (GDP) heightens the importance of the use of water in the sector, especially in the hotels and restaurants. Angulo et al. (2014) go on to explain that the increasing of water tariffs is the main instrument of intervention in demand management, which links back to the political factors. According to them, the viability of a water pricing policy that aims to encourage conservation of the resources through an increase in the water tariff in the short run depends partially on the ability of the end users to absorb these increases, and can be established through the calculation of the shadow price of the water, which is the price people are willing to pay for the water if there is no market price. In the long run, however, the viability of a water pricing policy will depend on the response of the

end users which will be reflected in the water demand elasticity (Angulo et al., 2014). This information is also useful for the planning of the freshwater supply (Angulo et al., 2014). A water pricing policy that includes the increase of water tariffs is a factor that is obviously connected to the political factors, but it will inevitably bring economic consequences for hotels, which is why it can be viewed as an economic factor.

In their article, Deng & Burnett (2002) describe another influential economic factor; **the reduction of operating costs**. A hotel building requires a considerable amount of freshwater just for daily operation (Deng & Burnett, 2002). The two authors state that in a typical medium sized hotel in Hong Kong, the annual bills for water and sewage charge may go up to one million Hong Kong dollars. Direct water saving, reduced sewage charge and indirect energy saving from saving hot water use causes a reduction in these operating costs and can make a noticeable difference on a yearly basis (Deng & Burnett, 2002). So, a responsible attitude towards water-use and saving water will lead to both operational costs saving and environmental protection. To achieve this, Deng & Burnett (2002) recommend that a water management programme should be established within a hotel. Indeed, big influences on how stakeholders respond to (potential) problems and make decisions about their water use are the financial and opportunity costs involved (Belle & Bramwell, 2005). Even though saving water can save costs in the long run, **installing water-saving measures can be expensive** and resources need to be available (Belle & Bramwell, 2005). Gabarda-Mallorquí et al. (2016) also state this by mentioning that additional organizational factors for hotels can serve as potential barriers to achieving a more efficient use of water. They give the example of Lloret de Mar, Spain, where cost reductions caused by reductions in water use are probably the main reason for hotels to implement water-saving measures, but that at the same time the high costs required to realize the necessary infrastructure for these measures are also one of the most important barriers.
Gabarda-Mallorquí et al. (2016) explain in their case study that hotels that are taking measures to reduce their ecological footprint can apply for a certificate stating that they are an eco-friendly hotel. Even though it has been found that hotels with an environmental and/or quality certification have reduced their water consumption rate per guest per night, which would also reduce costs in the long term, the general perception of hotels is that receiving a certification does not have any significant economic or even environmental benefits (Gabarda-Mallorquí et al., 2016).

Another economic argument for saving water mentioned by Deng & Burnett (2002) is that it can bring **potential for an improved market share**. If tourists value sustainability when going on vacation, then a hotel that mentions they take water-saving measures for ecological purposes can have an advantage over other hotels that might have not invested in these technologies and can therefore not as easily advertise themselves as “sustainable”. This has a lot to do with the mindset of the customer and, therefore, this factor not only connects to the economic cluster but also to the socio-cultural cluster, as will be analysed later.

### 4.2.3 Socio-Cultural Factors

From the literature it becomes clear that there are some influential socio-cultural factors. Both with regards to the hotels and their staff themselves, but also with regards to the tourists visiting the hotels.

A big influence in how stakeholders make decisions about water is their **level of awareness** of specific environmental problems, such as the threat of a freshwater shortage (Belle & Bramwell, 2005). Not only the awareness of the stakeholders themselves, the **awareness of the public** plays a significant role as well. Budeanu (2007) mentions that public awareness can be increased through informative tools, such as campaigns. This may lead to customers demanding certain standards from stakeholders. For example, tourists can exercise power through the choice to book and stay at a hotel that has an eco-friendly certificate. If this becomes a trend, hotels can sometimes feel the need to invest in CSR (King & Lawley,2016). This factor combines the socio-cultural cluster and the ecological cluster. Another link between these two clusters is that damaged ecosystems can, in turn, decrease the living conditions in coastal areas (Gössling, 2001).
Another important socio-cultural factor is our **perception** of whether simply accepting the problem without responding is acceptable (Belle & Bramwell, 2005). Is it okay to simply ignore (potential) problems regarding freshwater use? Is it okay to just keep using freshwater the way you have always been doing it? These are relevant questions when it comes to socio-cultural influences.
However, we also need to look at the tourists themselves. According to Lal et al. (2002), to achieve sustainable development, changes in the **behaviour and attitudes** of both producers and consumers, and changes in the distribution of resources among uses, users, time and space will be necessary. Although research has shown that many tourists have a positive attitude towards sustainable tourism, very few of them actually act accordingly by buying responsible products, behaving responsibly towards destinations and choosing more environmentally friendly ways of transportation (Budeanu, 2007). This low support from customers is one of the reasons, according to Budeanu (2007), that progress towards sustainable tourism is difficult. She mentions that specific barriers for sustainable consumption may lay in the nature of tourist choices. She goes on to explain the choices tourists have to make and their corresponding environmental impacts, which she illustrates clearly in figure 6 below.

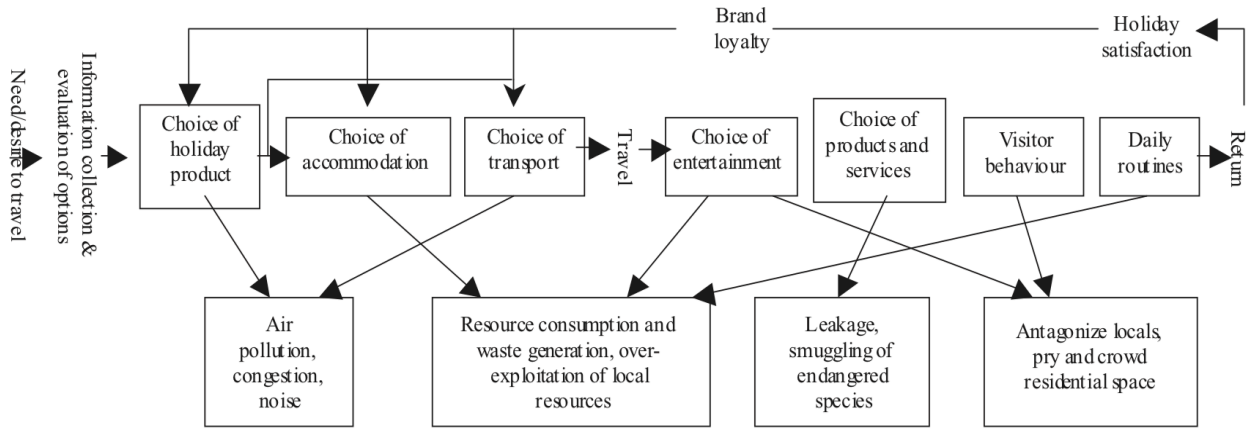


*Fig. 6: Tourist holiday choices and associated environmental impacts (Source: Budeanu, 2007).*

In figure 6 it can be seen that the choice of accommodation and the choice of entertainment affect the resource consumption and over-exploitation of local resources, under which freshwater falls.

Anable & Gatersleben (2005) explain that the tourist's choice of travel depends not on sustainability, but on convenience, flexibility, comfort, a sense of freedom and relaxation, so 'no stress'. It is because of these factors that the most favourable ways of transport for tourists within Europe are still via road or air (37% and 57% in 2017), instead of the more environmentally friendly transportation via railway, which made up only 2% of the total modes of transport used in 2017 (World Tourism Organization, 2018).
Another important factor to take into account is that, according to Carr (2002), people on international vacations tend to show more passive, hedonistic and careless behaviour than they would at home in their own country. This attitude also has effect on their water use. Gössling et al. (2012) explain that tourists' consumption differs significantly from that of local residents. This is characterised by a more lavish use of water, which is allowed by more free time for water-demanding activities such as swimming in a pool and by the fact that water from the tap is not included in the hotel bill. Price therefore is no limiting factor for tourists when it comes to using freshwater. Another important factor to take into account is that tourists, especially in seaside destinations, often have the habit of taking additional showers after swimming (Toth et al., 2018). Because tourists and residents differ so much in their water use, their number cannot just be added to the number of residents when trying to model the change in water demand caused by tourism (Toth et al., 2018). Trying to model this change in demand can get even more complex when considering the fact that there are water volumes in touristic cities that have to be supplied regardless of the present number of guests, such as gardens, pools and waterparks (Toth et al., 2018).
So, the more careless attitudes, the behavioural habits and the demands of tourists make that they differ significantly in their use of freshwater from local residents. They use a substantial amount of freshwater while being at their holiday destination, and therefore the tourists themselves are important factors to consider when making decisions about freshwater as a tourism stakeholder.

However, the mindset of the tourists is not the only influential factor here. According to Gabarda-Mallorquí et al. (2016), it would also be interesting to look at the environmental concerns of the hotel staff themselves. So, how the hotel owners, managers and workers feel the responsibility to adjust their practices to decrease their ecological footprint, as this could determine the extent to which water-saving measures are implemented.

Even though these social and behavioural patterns are very difficult to break, there are some tools that can be used (Budeanu, 2007). However, hotels are often not the ones to implement these tools. Instead, the government or municipality mostly decides on this. These tools will therefore be mentioned under "legal factors".

### 4.2.4 Technologic Factors

Technology is always developing and things that seemed impossible a few years ago are sometimes already taken for granted in this day and age. When it comes to using water, the progress being made with advanced technologies can provide solutions for modern day issues with water shortage because of the effects of climate change (Hydrofinity, 2018). A few examples of water-saving technologies that can be installed in hotels are water-saving toilets, water-saving faucets, low-flow showers, water-saving sprinkler bodies and water/moisture sensors (Hydrofinity, 2018). In the long term, these technologies can save significant amounts of water, and therefore reduce the costs of the hotel. These factors are therefore closely

connected to the economic factors, as they often require certain investments but can eventually reduce costs for the hotel. However, these water-saving technologies also contain initial costs, operating costs and maintaining costs (Chan, Wong, Lo, 2009). There are various technologies available, but besides their variations in costs, they may also differ in efficiency and effectiveness (Chan et al., 2009). However, many of these technologies do seem to work. In their two-year study on Hong Kong, Chan et al. (2009) have seen an annual reduction rate in water consumption of 7%, which shows an increased reduction compared to the 3% to 5% annual reduction rate in a previous study (Chan & Lam, 2001, as cited by Chan et al., 2009). Chan et al. (2009) state that they believe this increased reduction is probably caused by an increased awareness among staff and guest of the hotel, the adoption of more water-saving practices and the advancement of water-saving technologies.
Gabarda-Mallorquí et al. (2016) bring up the fact that hotels might **lack the technical capacity and the knowledge** on how to implement water-saving measures. This can especially be of influence in less developed destinations. As a solution, Gabarda-Mallorquí et al. (2016) advise the establishment of an advisory and technical support network within the hotel industry. This would help to equip hotels with the knowledge and tools needed to decrease their ecological footprint and to strengthen their resilience to future changes in water availability.

### 4.2.5 Ecological Factors

According to Cole's (2012) case study on Bali, the rise of the number of hotels is linked to many environmental problems that the island is dealing with, including the rising demand for freshwater. According to Belle and Bramwell (2005), small island developing states are often the most vulnerable to the impacts of climate change such as sea-level rise because of their long coastlines relative to land area and a large proportion of their area being low lying. They are in danger of erosion of beaches and shorelines, and also salt water intrusion in their freshwater aquifers (Nicholls, 1998, as cited by Belle & Bramwell, 2005). In the European Mediterranean, this goes up for destinations like Corsica, the Baleares, Malta, Cyprus and many islands in the Greek archipelago. So, for them the ecological factor of **climate change effects** is especially important and influential. According to Cole (2012), the **condition of the local water supply** can also be influential on how hotels decide to use water. If hotels are aware of resources being almost empty or contaminated, this could affect their water-using behaviour. In the most extreme way this will be because they simply cannot use the water anymore because the resource is empty, or the water could be dangerous for the public health.

Many regions in the Mediterranean are characterized by an arid and semi-arid climate (Tortella & Tirado, 2011). This means that, especially in the dry periods such as the summers, the groundwater recharge rates are extremely low (Gleick, 1998). In regions like this, excessive pumping of groundwater is unsustainable. Groundwater stocks are often thought of as "renewable", but the reality is that they are only renewable on a timeline that depends on the rate of inflow of water, the rate of the withdrawal of water and on the geophysical characteristics of the aquifer. Mismanagement of these three factors can lead to renewable freshwater resources becoming non-renewable (Gleick, 1998). In coastal zones, where many tourism destinations in the Mediterranean are established, excessive pumping of groundwater can also directly lead to irreversible and damaging effects, such as salt water intrusion and ultimate contamination of the entire groundwater stock (Gleick et al., 1995, as cited by Gleick, 1998).

However, it is not only groundwater that can cause problems. According to Gleick (1998), surface water can also get contaminated or even lost through mismanagement of its resource. Animal grazing and excessive human use can eventually lead to faecal contamination of surface water in mountain streams, which can form a threat to the health of ecosystems and end users downstream. Urbanization has caused high amounts of used water to be lost to sewers, instead of feeding streams or recharging groundwater (Gleick, 1998). Factors like this directly influence the environment of the hotel. CSR has, since recent years, caused hotels to take their responsibility for their action patterns and the effect that these have on their own environment, both locally and globally (Kasim et al., 2014). So, what are things that hotels can actually do that will impact their water use and its ecological effects? According to Gössling (2001), there are several options. Hotels can try to reuse (part of) their wastewater for irrigation purposes. However, this measure can sometimes come with unforeseen damage to the environment or the public health, because of the chemicals that can be in the wastewater. Close attention and inspection are required here. Other, less risky measures could be the collection and storage of rainwater, the installing of technological tools such as flow limiters on taps and showers and reduced flush options for toilets (Gössling, 2001). Another important measure mentioned by Gössling (2001) is a regular inspection of water pipes to avoid water losses due to leakage. Educational programmes for hotel staff and awareness campaigns addressed at tourists could also contribute to water reduction (Gössling, 2001) and an overall increased awareness of the effect people's choices and activities have on the environment. For example, tourists could be made aware of the amount of water they use for a 10-minute shower, or the amount of energy used for a hot shower. This could increase the awareness and potentially alter behaviour.
Many hotels that are taking measures to reduce their ecological footprint can get certain certifications, such as the TripAdvisor GreenLeaders badge, which shows customers looking for accommodation on the TripAdvisor website which hotels are eco-friendly (TripAdvisor, N.D.). This connects to the socio-cultural factors as it depends on the customers themselves whether they value a certification like this or not. However, looking from an ecological perspective, Gabarda-Mallorquí et al. (2016) have shown that hotels with some sort of environmental certification have significantly reduced their water consumption per guest per night. This shows that, ecologically, certifications like these can be considered influential for the water use of hotels.

Another influential ecological factor was discovered by a case study on Hong Kong. In their case study, Deng & Burnett (2002) have looked at the effect of a factor closely related to climate; the weather. More specifically, the relationship between the monthly mean outdoor air temperature and the monthly total water use of the hotel. From their findings they could state that water use in the hotel is generally not directly affected by a variation of outdoor air temperature. This does not mean, however, that it could not be indirectly affected. In destinations that are only popular in a certain season - for example, beach destinations in summer or ski-resorts in winter - the temperature can be an important factor for people choosing to go to that destination. When, for example, in the beach destination of Rimini it is predicted that it will rain a lot and the maximum temperature during the day will be no higher than 20 degrees, some (domestic) tourists might decide not to book, to cancel or to leave earlier. This will, of course, indirectly affect the amount of water used by hotels.

### 4.2.6 Legal Factors

During periods of drought, governments or municipalities might adopt certain **legal measures** to avoid freshwater shortages. An example of a measure is prohibiting the filling or refilling of swimming pools, as occurred in the municipalities of Altea and Murla in the province of Alicante in Spain during the summer months of 2014 (Morote et al., 2017). These same municipalities are also enforcing certain measures to reduce freshwater consumption, such as the prohibition to refill your pool every year. This is an effective measure considering the enourmous amount of single-family pools that together account for 80.72% of the total volume of freshwater consumed (Morote et al., 2017).

As mentioned under "socio-cultural factors", tourists are massive freshwater consumers (Toth et al., 2018). In her article, Budeanu (2007) mentions several **(legal) tools** that can be used to influence the behaviour of tourists with regards to the environment and the local society, such as water-use. These tools can be increasing the costs for environmentally destructive behaviour in the form of fees or even fines; decreasing the costs for environmentally proactive behaviour, for example through subsidies; and providing education that makes tourists aware of the environmental consequences of their behaviour. These tools can have consequences not only for the tourists, but also for the hotels, which are often the facilitators of specific behaviour. However, the opposite can also have an influence; according to Cole (2012), **regulatory issues** such as inadequate checking or an absence of rules can influence the way hotels behave. This also goes up for their water-using behaviour.

Another factor related to the legal cluster, mentioned by Cole (2014), is the factor of **international human right laws**. On the international CSR agenda, the debate about private businesses and human rights has become a central theme and efforts are being made to integrate the awareness human rights into this corporate sector (Cole, 2014). The main question here is what businesses need to do to comply with international human rights laws and guidelines (Cole, 2014). Since 2010, the United Nations General Assembly officially acknowledged the right to water and sanitation as a basic human right and also recognized that the access to clean drinking water and sanitation is crucial to the realisation of all human rights (UN WATER, 2014). This means that a freshwater shortage in a destination could pose a threat to the human rights of the residents of that destination, as it could threaten their access to fresh drinking water. Even though this law is mostly focused on developing countries (UN WATER, 2014), an increasing demand combined with a decreasing supply of freshwater in many developed countries leads to this human right also becoming of importance for companies in destinations in certain developed countries, such as in the European Mediterranean. According to Cole (2014), the undertaking of measures to safeguard the human right of access to clean and safe water – for example through water-saving measures and regular checks on the hotel's water system – can protect companies from potential lawsuits & litigation.

The above show that the legal factors also connect to economic factors. By avoiding fines, you save money, and sometimes monetary investments need to be made in order to avoid fines in the future.

## 4.3 Other Factors

In this section, answers were found for the third secondary research question; *"Are there other factors having an influence on the decision-making process of water-use in hotels and how do they interact?"* Tortella & Tirado (2011) mention that there is a set of factors for determining the consumption of water by a hotel that are based on the hotels' **physical characteristics**, such as the hotel size and the existence of a swimming pool, garden or golf course, and on occupancy factors, which are the number of guests and overnight stays. The occupancy factors are partly influenced by the seasonal component, as **seasonality** is a characteristic that is shared by several leading tourist destinations in the world, such as the European Mediterranean, and major efforts are being made by local governments recently to reduce this. Tortella & Tirado (2011) argue that an analysis of the potential effects of seasonality on water consumption is fundamental. Deng & Burnett (2002) mention the potential influence of **operational factors**, which shows some resemblance to the physical characteristics from Tortella & Tirado.

Secondly, they also consider that the **management system** of the hotel may have a significant impact on its water consumption. They believe that key management issues such as the operating strategies of the hotel, the system of accommodation on offer, the development and adoption of water saving measures as a response to demands coming from the market, and chain affiliation may all play a considerable role when determining the freshwater consumption of a hotel. It is important to take into consideration that in many hotels, water management is not, and actually cannot be, separated from energy management (Deng & Burnett, 2002). However, although water use *can* often be managed together with energy use, it is important to note that water management in hotel buildings has its own specific character which should be taken into account in the management strategy (Deng & Burnett, 2002).
Proper management of water use in hotels is necessary, according to Deng & Burnett (2002), to be able to achieve the best possible water use performance in terms of environmental protection and cost saving, while maintaining the required service of the hotel.

Through their case study of water use in hotels in Hong Kong, Deng and Burnett (2002) have collected data about, among other things, the **hourly water use profile** on guest floors. See figure 7. It was discovered that there were two peak periods in the hourly water consumption profile; the first peak was from 7:00 to 10:00 – with most water being used at 8:00 – when most guests would wake up and get ready for their day, for example by taking a shower. The second peak was from 20:00 until 23:00 – with most water being used at 22:00 – when most guests were preparing to go to sleep, for example by taking a shower or brushing their teeth.

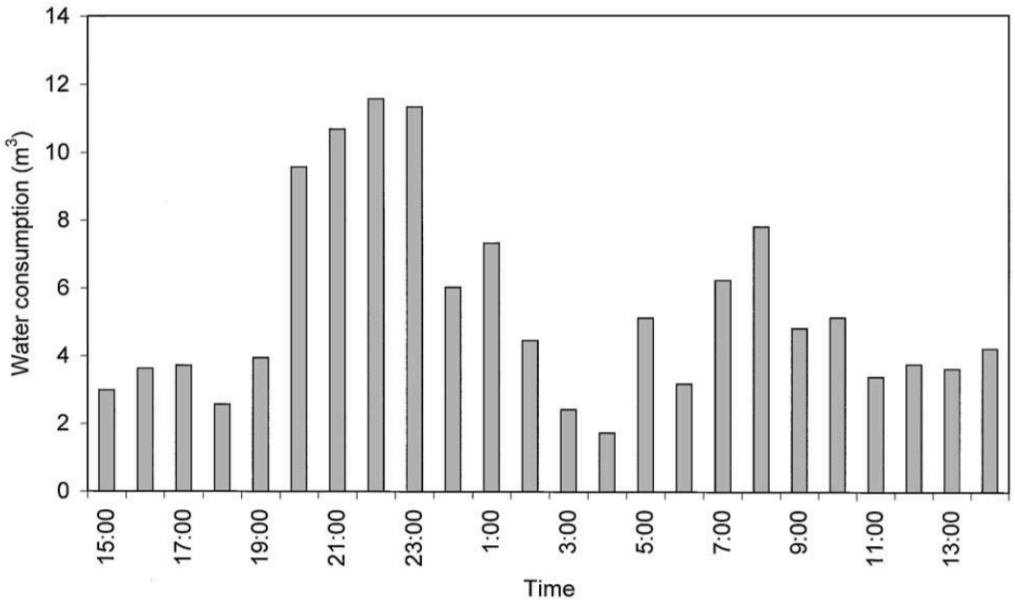

*Fig. 7: A typical hourly water consumption profile on guest floors.* (Source: Deng & Burnett, 2002)

In an interview with Emanuele Gallone from HERA S.p.A. (22-05-2019), it became clear that this hourly water use profile is definitely relevant. Around the peak periods, the water distributor can lower the water pressure to save energy. During the peak periods, they can turn the water pressure up again.

Gabarda-Mollorquí et al. (2017) state that there are 3 broad categories of factors that influence the water use of hotels. These categories are physical characters, facilities and leisure structures that require water and business and environmental management models. When it comes to the physical characters – which agrees with the physical characters mentioned by Tortella & Tirado (2011) – Garbarda-Mollorquí et al. explain that there are 3 main factors; capacity, floor area and category. According to them, it is largely agreed that hotel capacity is an important determinant of water use. This agrees with the general rule introduced by Gössling (2001), which stated that the more guestrooms and beds a hotel has, the more water it will use.

Gabarda-Mallorquí et al. (2016) show in their study that hotels belonging to a chain consume more water per guest than independent hotels. They refer to the study by Tortella & Tirado (2011) in which it is pointed out that hotels that belong to a large, international chain may have less stimulation to reduce their water costs, as these costs only account for a small part of the total running costs and would therefore not have a significant impact on their profit margins. Tortella & Tirado (2011) also mention that, in addition to this, hotels that belong to a chain tend to have higher standards of service than hotels that do not, which gives an explanation for a greater consumption of water from affiliated hotels. To improve the water efficiency and reduce the water use of affiliated hotels, chains could introduce standards and goals for their hotels, and could include water-saving practices in the information that is shared among members (Gabarda-Mallorquí et al., 2016).

## 4.4 The Case Study

We will now look at the situation in the case study area of Rimini. The company responsible for the water sources in the municipality of Rimini is RomagnaAcque – Società delle Fonti. RomangaAcque is responsible for half of the Romagna region and controls the actual, physical sources where the freshwater is coming from. In the ERR there are two types of freshwater sources; wells containing groundwater and surface water coming from the mountains. This last source is cheaper to use because it makes use of gravity; the water does not need to be pumped up.
In the municipality of Rimini, most water is coming from the wells that are in the area. However, in summer both types of sources (groundwater and surface-water) need to be used to be able to provide for the demand.
After obtaining the freshwater from the sources, RomagnaAcque sells it to HERA S.p.A., a multi-utility that is mainly working in the environment, water and energy clusters (Gruppo HERA, N.D.). HERA S.p.A. is, among other things, responsible for the distribution of freshwater among consumers – this includes hotels and other stakeholders in the tourism industry, but also the houses of residents – in the municipality of Rimini.
The water price in Italy is, just like in many countries, determined by a complex increasing-blocks tariff structure (Toth et al., 2018). In table 2 below, you can find the actual prices of freshwater determined by HERA in 2019 for the "*uso non domestic, industrial/strutture alberghiere*" which translates to "non-domestic use, industrial/hotel facilities".

| USO NON DOMESTICO INDUSTRIALE/STRUTTURE ALBERGHIERE | FASCIA DI CONSUMO (mc/anno) | | UNITA' DI MISURA | Tariffe applicate nell'intero bacino |
|---|---|---|---|---|
| | da mc/anno | a mc/anno | | |
| Tariffa Base | 0 | 400 | €/m$^3$ | 1,694556 |
| Tariffa eccedenza | 400 | senza limiti | €/m$^3$ | 2,365245 |

*Table 2: Bacino HERA Rimini: Tariffe 2019 post TICSI (Source: Gruppo HERA, 2019).*

The table shows that when a hotel uses up to 400 cubic meters of freshwater per year ("*da mc/anno*"), a different tariff is used than when a hotel uses 400 m$^3$/year or more ("*a mc/anno*"). Until 400 m$^3$/year, the price per cubic meter (€/m$^3$) is €1,694556, from 400 m$^3$/year the price per cubic meter is €2,365245. This shows that from 400 m$^3$/year, the price goes up significantly and the economic factor of "price" might become more important for hotels that fall in the second tariff box when making decisions about their water use or water-saving measures.

Of the total of 12 hotels that were being interviewed, 7 were 3-star hotels and 5 were 4-star hotels. The hotels were first asked about their target population, to see if this would differ between the hotels and if that could possibly be an indicator for water use. However, the answers all lay very close to each other. Most hotels focused on (young) couples and families, especially in the high season. Some hotels also mentioned that during winter, they focused more on business people as this is the tourism low season:

- *"How would you describe your main target population?"*
- "In particular in this period we work a lot with families because we are near the sea and now starts the summer season (…) but in winter we work a lot with business

people. This is because there is a really big exposition theatre in Fiera that is famous in all of Italy and also because 1 kilometre from here, there is another smaller [congress hall] to hold expositions.

After this, the hotels were asked to mention the water demanding facilities that were present in the hotel. Here, a pattern became visible. Most 4-star hotels that were interviewed owned more water-demanding facilities than the 3-star hotels. All five 4-star hotels that were interviewed owned a swimming pool and had guestrooms equipped with bathtubs instead of only showers, compared to only 3 out of 7 3-star hotels that owned a pool, and 2 out of 7 3-star hotels having bathtubs in the guestrooms. 3 Out of 5 4-star hotels contained a spa, compared to 0 out of 7 3-star hotels, and 4 out of 5 4-star hotels had a garden that needed irrigation, compared to 3 out of 7 3-star hotels. So, it seems highly likely that 4-star hotels, on average, contain more water-demanding facilities than hotels with less stars. This is not an extraordinary observation when you realize that hotels with more stars normally offer more comfort and service (Warehouse Hotel, 2018).
However, an interesting point to mention here is that one hotel stated that the quality of hotels with the same number of stars can differ per region:

- "Okay. For example, a 3-star hotel in Miramare is not like a 3-star hotel here in the centre"
- *"So, [in the centre], in general, they are better?"*
- "Yes. Here they are better, in general. Also, the stars can differ per region. For example, here in Emilia-Romagna, the necessary points for receiving the total number of stars for your hotel are different than in other regions. For example, in Liguria, the hotels that have 3 or 4 stars are like hotels that have 3 or maybe even 2 stars here in Emilia-Romagna. They are different."

This would mean that one cannot simply draw general conclusions on the influence of the number of stars on the water use, as the requirements per star differ per region.

After it was established what the water-using facilities of the hotel were, the interview questions zoomed in on the different clusters of the PESTEL model, and their influence on the hotel. These will be discussed below.

### 4.4.1 Political Factors

The hotels were asked if they experienced any pressure from the government or municipality when it came to using water. Examples of certain pressure can be policies with regards to water use or water saving, subsidies to promote certain behaviour and taxes to discourage certain behaviour.
The hotels indicated that they did not know of any regulations that were implemented by the government to reduce the amount of freshwater being used:

- *"Do you notice anything about how [the government or municipality tries] to influence you on how you use the water?"*
- "No. Normally there are no regulations. You just pay, you know. The more you use, the more you pay, but there are no rules like how you have to use it. There are no rules."

This statement was confirmed by other hotels, as well as during the meeting with Dr. Toth & Dr. Bragalli (10-05-2019). However, some hotels mentioned that they noticed the government was involved in the freshwater use in other ways, for example through subsidies:

- *"So, according to you, what are the political factors that influence how your hotel uses water?"*
- "There are subsidies to promote certain activities."

However, it should be noted that these subsidies were only mentioned by one hotel, and it was not fully clear what these subsidies were about. Because it could definitely be an influential factor, it will still be put into the model under political factors, but the reader should be aware that from the general findings on this factor it cannot be concluded that this factor is of real influence on the water-using behaviour of hotels.
Another interesting way in which the government was influencing the use of freshwater was explained by one hotel, who stated that the government was promoting drinking freshwater from the area instead of buying plastic bottles of water from the supermarket:

- *"Do you sometimes feel that there are political factors that are trying to influence how you use the water?"*
- "The government promotes our water, because, for example, in the last year, we opened the *Diga di Ridracoli* (dam of Ridracoli) in this area. It is a good dam, that brings really good water from the mountains."
- *"That was opened last year?"*
- "Yes. The government, in this winter for example, showed a promo-video on tv that they opened this dam. The government wants the people to start drinking directly from their tap."
- *"Instead of buying water from other sources?"*
- "Yes. Because the government has invested a lot of money to open this [dam], so they want that the people can drink this water because it is good water."
- *"Okay, so you can notice that the government is trying to influence people's behaviour."*
- "Yeah. Because, in the supermarket, there are a lot of private companies selling water in plastic bottles. This [dam] is a governed business, a public business. So, also for this reason, the government wants to sponsor this type of water use."

This quote from one of the interviews shows that the government is involved in the use of freshwater in multiple ways. However, this seems to be more about taking on private water companies and possibly even plastic waste, than about influencing the water use of hotels. From the interviews it seems that the government is not actively trying to reduce water waste and promote saving water. This assumption is reinforced by the information that was received in the meeting with Dr. Toth and Dr. Bragalli (10-05-2019). They also stated that in times of water shortage, looking for ways to reduce the water use is the last option for the municipality. Instead, they try to find other sources to be able to keep supplying the demand of freshwater. This is why regulations on water use are not very common and have only been put up during extreme periods of drought and water shortage, which, for example, have been

the summers of 2007, 2011, 2012 and 2017. These regulations will be further explained under the legal factors.
Despite efforts, I was unable to reach the municipality to ask about their perspective on policies regarding water use and water-saving.

### 4.4.2 Economic Factors

The next factors were the economic factors. I expected these to be of most importance for the hotels, as they are private companies that need to make profit. Examples of economic factors were investments and extra costs, profit, water price etcetera. An important realization was that for a large part, the hotel cannot control how much water is being used, as much of the water-using activities happen within the guestrooms:

- *"what are the economic factors that influence how you use the water?"*
- "Here, we cannot control anything, because everything **depends on the clients**. Clients do not save water because they know that they are not paying for what they are using. It is the agency that is paying. So, when the cleaning ladies enter [the rooms], there are always lights turned on. They are not saving. They do not care about saving. And, because of that, we do not have any control, you know, to stop it. We cannot choose how much water they actually use."

The hotel can influence the tourist's behaviour, for example by putting up signs in the guestrooms making tourists aware of water saving measures such as leaving up towels that do not need to be washed, but they cannot fully control it.
Another economic factor that was mentioned were the costs of the water. One of the hotels mentioned that the price of the water has been increasing:

- *"Has [the water] become more or less expensive?"*
- "[The price] is always increasing."

However, when looking at the tariffs for water of last year provided by Gruppo HERA (2018), the prices for hotels are exactly the same. Tariffs of previous years were not available, so that could not be checked.
Other hotels did mention that they thought the price of the water itself was not expensive, but that **external costs** made it expensive:

- *"Now we come to the economic factors. From the hotels I have already interviewed, I have heard that the water is really cheap in Rimini, so I was wondering if hotels find it worth it to invest in water-saving measures?"*
- "The water may be cheap, yeah, usually in Italy it is cheap because we have a lot of mountains, so we have a lot of water. However, the things around this are not cheap. For example, the systems that heat up the water are industrial mechanics, so this part of water is not cheap. It costs a lot of money. The same counts for energy, because when you start these machines, they need a lot of electricity. If you want my point of view, the water is not cheap."
- *"So, the water itself may be cheap, but the extra costs are what is expensive"*
- "Not only the machines that warm up the water. The tubes [to transport the water] are not simple tubes, and all parts of the water chain need to be checked because the

government does a lot of checks on the water. If you say [to the guests] 'you can drink the water directly from the tap', I first need to check the water that comes from the tap. So, there are also these kinds of costs. I do not check it, doctors check it. The scientists. So, you need to look at all these parts."

Besides the costs of energy that come with using water and costs of the tubes, another costly factor when using water is the cleaning of the water in the pool. This of course only goes up for hotels with a swimming pool. As one hotel explained:

- "See, when we are opening the pool, the costs are for chemicals that we are buying, and we are using very expensive chemicals to clean the pool. That costs around, you know, €1000 for us to open the pool. Almost around €1000. It is not the cost of the water, most of the price that we are paying is for the chemicals. (…) We do not think about usage of water when we are opening the pool or planting the trees."

These statements make it clear that of the economic factors, the price of the water is not very influential nor limiting for the water-using behaviour, because it is viewed as cheap. The costs of **energy use**, of **infrastructure** in the form of tubes and of **chemicals** for the pool are higher and therefore more influential for hotels.

### 4.4.3 Socio-Cultural Factors

The next cluster zoomed more in both the customers and their influence on the behaviour of hotels regarding water use, and on the mindset and point of view of the hotels themselves. When I asked one hotel about their water use and the wasting of water, it became clear that according to them, "wasting water" is something else than "using water":

- *"Do you control how much water is being used?"*
- "No, we do not control it. We just use it, because we never had any problems with the water. We just use it. But we are not wasting it, you know. We are using it."

This indicates that for some hotels, "wasting water" has a different meaning than for others, and that for some, "using water" is not equal to "wasting water", even though it definitely can be; using the water inefficiently can cause unnecessary water waste. The negative aspect of this black-or-white way of thinking is that it leaves out facts like that, which can cause "saving water" to be very low – or not even – on the priority list of a hotel. It is worth noting, however, that not all hotels that were interviewed shared this **way of thinking**; for some, using water in a more responsible way is definitely an important goal. Here, CSR often played a role. CSR is, according to King & Lawley (2016), the response of firms to issues such as sweatshop labour and environmental pollution. Because of the increased attention by the press, public awareness and campaign groups, firms often need to respond to these issues to protect their reputation and brand image.
Some hotels did see **CSR** as a great possibility to boost their reputation and to appeal to more clients:

- *"Does your company consider CSR?"*
- "Yes, because it increases the attention of our clients and of potential future customers."

However, others mentioned their guests did not care about the CSR of the hotel or even conflicted with it:

- *"Does your company consider their CSR?"*
- "We try to, but our guests' requests do not cope with our CSR very often."

This brought the attention more to the customers themselves. To get to know more about the **mindset of the tourists**, I asked the hotels if they had noticed any sign of guests being interested in their water use or water-saving measures:

- *Do you ever get questions from guests about [water use], or do you feel that it is more and more important to think about those kinds of aspects?"*
- "I think that until now - like, this is my second year here - nobody has asked me anything about water. They really do not care about it."
- *"And why do you think that that is? Why they do not care? Do you have any idea?"*
- "Because they are on a vacation, and they are not thinking about all these things, you know. They just want to enjoy their time and they want to be stress-free, and they are not thinking about all these things because Rimini is a touristic place, and everyone is coming here to have fun and they are not stressing their mind thinking about these things you know. Like, water usage and this kind of stuff."

From most hotels that were being interviewed, I got a similar response; the tourists in Rimini do not really care about whether a hotel is saving water or not. However, just because the tourists do not notify the hotel staff about their concerns does of course not mean that they simply do not care. There are also hotels in Rimini that pride themselves for being eco-friendly and advertise themselves like this. It could be that the tourists that stay at these hotels have chosen this accommodation on purpose for this reason. To find this out, more information is needed on the tourists themselves.

### 4.4.4 Technological Factors

When it came to the technological factors, the main aspects for hotels were technological innovations and keeping up with them, and what was technically (im)possible with regards to using water in a more responsible way. The hotels were asked what technologies with regards to their water use they were making use of, and what their influence was. The quote below from one of the interviews shows that **technology is being used**, but that it is not always used with "saving water" as a purpose:

- *"Do you feel any pressure to keep up with technology or to implement technology here, or do you use any water-saving technology already?"*
- "There is technology only showing how much water we are using, but we really do not care about this technology. It is just being used and we are not controlling like "oh we are spending this much water we need to save it", no. So, there is technology telling us how much water we are using, but we are not trying to save it."

Also, some hotels are interested in investing in more sustainable forms of technology, for example solar panels or water tanks to collect rainwater that can be used for irrigation, but they are held back by the government. This will be further explained under the legal factors.

### 4.4.5 Ecological Factors

All hotels that were interviewed were aware of modern-day issues regarding climate change and the threats of draining natural resources. Some of them had already felt the local effects of more extreme weather situations, with a serious drought in 2017 (ForlìToday, 2018) and extreme rainfall and very low temperatures in May of 2019, which made it the coldest May of the new millennium (ForlìToday, 2019). Not all hotels felt the responsibility to take water-saving measures within their hotel to minimize their ecological footprint, as you can see by this example coming from one of the interviews:

- *"Is saving water a priority for your company?"*
- "No, because we have a spa that needs to use a lot of water."

Some hotels were also taking water-saving measures, but for other reasons than ecological ones:

- *"You told me you do not really take water saving measures, but for example watering the trees at night is already [a kind of] measure because then you avoid the water from being [evaporated] by the sun immediately."*
- "Ah, yes, we do that but that is because we do not disturb clients in the morning. I am just being frank."

However, there were also some hotels that had actually taken measures to save freshwater and reduce their use of energy. These measures often focused on the customer, for example by trying to influence the behaviour of the guests or by simply implementing certain (technological) rules or restrictions. See the examples coming from different hotels below:

- "We try to educate all our guests to use water without wasting it, we do not wash their towels if they do not need it."

- "Cleaning the towels everyday even it if is not necessary is a habit of many hotels. We try to change this."

- "The air-conditioning works only if the windows are closed to prevent wasting energy"

- "We do have a flush-cutter for each room in order to cut the flushing of water in the toilet. We also have cards in the room mentioning that guests can throw the towels that they want us to wash on the floor, so we do not need to wash all the towels."

- "We use water reducers for every sink and bidet, and we have tried to make guests aware of water waste signs."

From the interviews it became clear that the most common way used by these hotels to reduce their water use is to adjust their laundry practices by letting guests keep the towels that do not need to be washed.
One of these hotels also mentioned another interesting and useful measure to let no freshwater go to waste:

- "We also use bottles of water left by the guests for watering the plants."

Another one of the hotels that was interviewed mentioned that their hotel chain was dedicated to a specific Ecology programme. This has, of course, a lot to do with companies taking their CSR and it shows that in the hotel sector, attention is moving towards more environmental-friendly practices.
Ecological factors were often connected to socio-cultural factors, because they were often considered important because of the rise in public awareness and the effect that their response – or a lack of response – could have on their brand image. It also relates to technological factors, as technological innovations can guarantee better water-saving technologies. Last but not least, ecological factors relate to economic factors, as the implementation of certain measures – such as technological facilities – to reduce a hotel's ecological footprint needs investments. In the long run, however, making use of these measures could cut the costs of the water bill, as less freshwater is being taken from the tap.

### 4.4.6 Legal Factors

Last but not least, the hotels were questioned about potential influential legal factors.
During the meeting with Dr. Toth and Dr. Bragalli (10-05-2019), I was told that in the years 2007, 2011, 2012 and 2017 the Rimini area experienced a water crisis. The winters had been more arid than usual, with less rainfall, which caused the groundwater level to be low and, therefore, the wells to be almost empty. In these years, the municipality introduced a list of orders for residents and companies in Rimini. The translated version of the document containing the orders of the mayor for the time period between the 28th of November 2011 until the 31st of May 2012 can be found in the Appendix. In the document, the mayor mentions the law "guidelines about water" established on the 4th of March 1996, chapter 8.2.10, which demands "in the case of scarcity of water resource, the adoption of measures towards the limitation of the use of freshwater when it is not needed, and the saving of it" (Comune di Rimini, 2011). This document is very interesting because it shows the exact legal measures taken by the municipality to reduce the use of water by residents and by companies to avert the freshwater shortage from becoming dangerous for the public health.
The order, which is signed by the mayor, explains that there is a freshwater crisis going on and that certain measures will be taken to decrease the waste of freshwater in the territory of the municipalities of Forlì-Cesena, Ravenna and Rimini. The order also states that it is necessary that the activities of prediction, monitoring and pre-announcement come together with strong and efficient action of prevention, softening and fighting against, that – if planned in time – could reduce the possible effects of a freshwater crisis on the population, farms and productive system drastically (Comune di Rimini, 2011).
The order continues by stating the rules that were implemented from the 28th of November 2011 until the 31st of May 2012. Without any exception in this timetable, it was forbidden to use freshwater for:

- the irrigation of (vegetable) gardens, soccer fields, tennis courts, public gardens & parks;
- the domestic washing of cars and motorbikes;
- the filling or partial filling of swimming pools, fountains and ponds.

After stating the rules, the document contains a warning which informs the reader of the penalties of violating the orders. Failing to obey to these orders will lead to a fine between €25 and €500, depending on the specific violation and the proportion of it. If a fine is imposed to a company, such as a hotel, the fine will be charged to the management of the place.

During the interviews, I showed the interviewees the (Italian) version of this order from 2011 and asked them if they were aware of orders like this, if they remembered this specific order and how their hotel responded to it. Some hotels recognized the order but told me that orders like these were not very serious to them, despite the compelling language being used in it. The reasons most often mentioned for this was that the controlling of these rules was inadequate and very difficult to begin with. See the following quote from one of the interviews below:

- "These are, like, suggestions from the government, because who can really see if no one use the water? Probably, these types of things can happen, but it is unlikely that someone will get a penalty because it is so difficult to check if someone is using the water. It is difficult. (…) The police need to check all houses, all houses that have a garden, for example. You know? It is impossible. So, it is a problem."

However, not only in times of a freshwater crisis are hotels in risk of getting a penalty; once every year the quality of the water from the tap in each hotel is checked by an expert and if he or she finds pathogenic bacteria, the hotel can expect to receive a penalty. See the quote from one of the interviews below:

- *"These [rules I just showed you] are quite extreme but are there even rules in general?"*
- "Yeah. Like I said before, once per year, a police officer arrives with a doctor or a scientist to check the water. If your water is not at the standard, you receive a penalty. After, you need to know which type of penalty you get, because in the water a lot of different types of bacteria exist. So, different bacteria cause different diseases, which causes different penalties."
- *"Okay. But do you then get that penalty or does HERA get that penalty?"*
- "It depends on the structure. If it is a private house, it is the responsibility of HERA. In my case, which is a business, it is my responsibility. Also, because maybe HERA gives me good water, but maybe my tube or my machine to make the water hot is not good. So, you can understand that before the water arrives here, it is the responsibility of HERA. When it arrives here, now it is my responsibility."

This statement was confirmed in an interview with Emanuele Gallone from HERA S.p.A. (22-05-2019). The yearly check-up and threat of a penalty, however, are in place to ensure the quality of the water coming from the tap, not necessarily to reduce the unnecessary use and wasting of freshwater. It is becoming clear that even though freshwater is something the government is involved with, attention is not (yet) on getting residents, hotels and tourists to

use freshwater in a more responsible way. In fact, the following quote from one interview makes it look like the municipality is actually opposing some water-saving measures proposed by hotels:

- *"Would you maybe have ideas about options for you to reduce water consumption?"*
- "In my case, I do not have any idea about how to save water. Maybe, I can do a little deposit of water in the roof. But for the law, I cannot do it. We thought about this deposit, but the law said you cannot do it. I do not know the reason. Or, to use solar energy for the machine that heats up the water. Maybe in this way, particularly in summer, the energy created from solar panels can heat up the water. To not save water but to save money. That is how I think. But, I cannot. The government told me "No, on your roof, you can't.""

Unfortunately, I was unable to find out the exact reason this specific water-saving measure was blocked, as I was not able to get in contact with the municipality.

## 4.5 The Comparison

In order to be able to compare the results from the literature study and the case study, two adjusted conceptual models were designed for both studies, containing the results to the question of what the influential factors are. Below the models, there is a row of factors listing what every abbreviation in the model stands for. Below the models, the models and their similarities and differences will be analysed and explained.

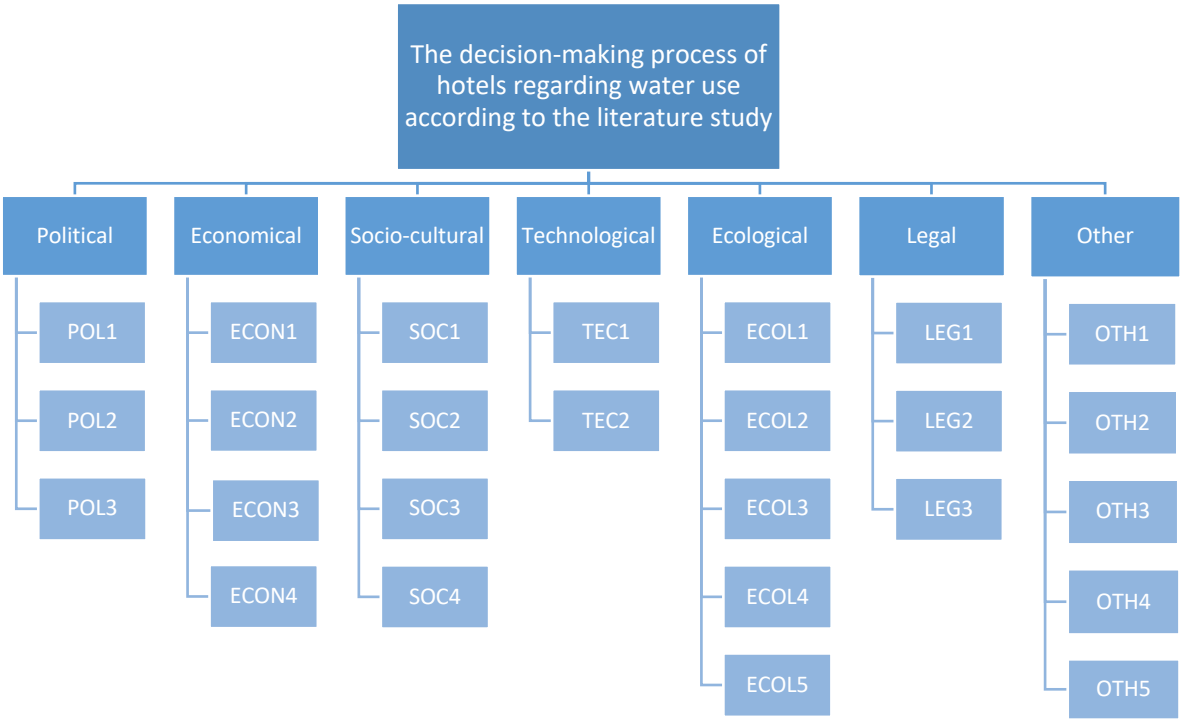


*Fig. 8: Model representing the influential factors on the decision-making process of hotels on their water use, based on the literature study.*

POL1: Managing of water supply (available resources)
POL2: Managing of water demand (water use)
POL3: Policies focused on water-saving
ECON1: Increasing water tariffs
ECON2: Long-term reduction in operating costs
ECON3: Short-term investment in water-saving technologies
ECON4: Potential for improved market share
SOC1: Level of awareness within the sector
SOC2: Level of public awareness
SOC3: Perception of the seriousness of the problem
SOC4: Behaviour and attitude of the tourists
TEC1: Technological innovations with regards to water-saving measures
TEC2: Lack of technical capacity and knowledge
ECOL1: Climate change effects
ECOL2: Condition of local water supply
ECOL3: CSR
ECOL4: Eco-friendly certifications

ECOL5: Weather
LEG1: Human right laws
LEG2: Legal tools
LEG3: Regulatory issues
OTH1: Physical characters of the hotel
OTH2: Seasonality
OTH3: Operational factors
OTH4: Management system of hotel
OTH5: Hourly water use profile
OTH6: Independent or belonging to a chain

Below, you can see the adjusted conceptual model for influential factors for the water use of hotels from the case study. The hotels were asked to rank the clusters on the basis of how important they were to their decision-making process about water use. The results are imbedded in the figure below, which ranks the clusters from "most important" (left) to "least important" (right) as divided by the hotels themselves.

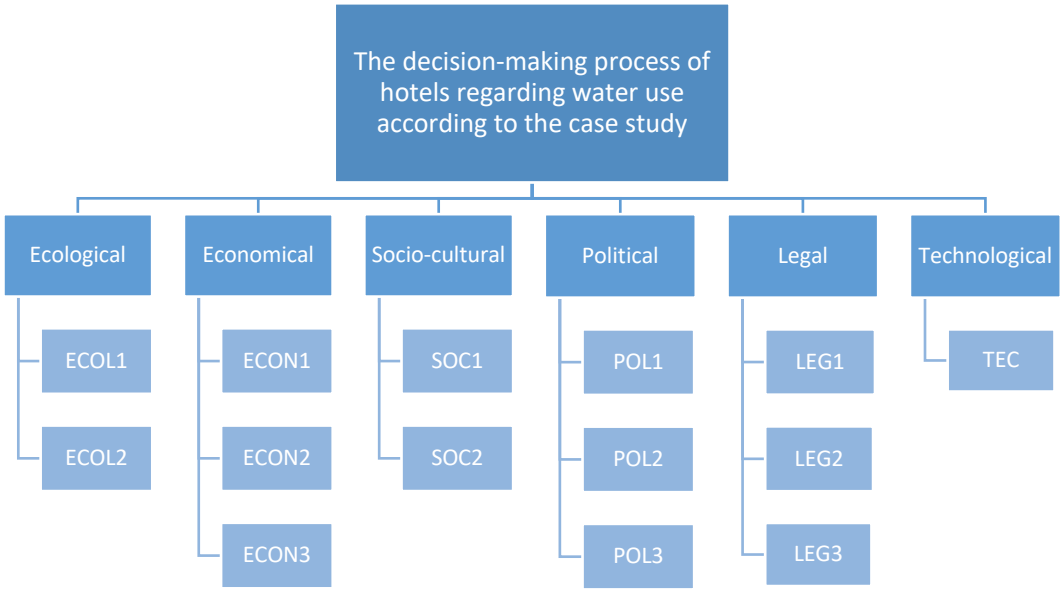


*Fig. 9: Model representing the influential factors on the decision-making process of hotels on their water use, based on the case study.*

ECOL1: CSR
ECOL2: Measures to reduce ecological footprint (including water-saving measures)
ECON1: Water tariff
ECON2: Water-using behaviour of customers
ECON3: Indirect costs of water use
SOC1: Mindset of hoteliers
SOC2: Mindset of tourists
POL1: Normally no regulations on water use
POL2: Subsidies to promote certain activities
POL3: Promotion of drinking freshwater from the tap
LEG1: Orders given during water crisis
LEG2: Penalties if water quality is inadequate

LEG3: The blocking of water-saving technologies
TEC: Usage of water measuring technology

By looking at the two models, some things immediately stand out. According to the literature study, the most extensive clusters are the Economical, Socio-cultural and Ecological clusters, which contain 4 or 5 factors, followed by the Political and Legal clusters, which both contains 3. These results differ slightly from the results of the case study where the most extensive clusters turned out to be the Political, Economic and Legal ones, containing 3 factors each, with the Socio-cultural and the Ecological clusters following. Even though, in the case study, the clusters that were considered to be of most importance were not necessarily the most extensive, the three most important clusters in the case study were also the three most extensive clusters in the literature study, which meant that most information could be found in the literature on influential factors falling within these clusters. These were the Ecological, the Economical and the Socio-cultural clusters.

Let us first take a look at the Ecological clusters in both studies. An ecological factor that was found in the literature study and that returns in the case study is the CSR (lit. study ECOL3) (case study ECOL1), which indicates how hotels or hotel chains should respond to certain – in this case environmental – issues and how they should communicate this response to their customers.
The effects of climate change on hotels and their water use are combined in one factor mentioned in the literature study (lit. study ECOL1). This factor, however, together with the factor “condition of local water supply” (lit. study ECOL2) does not return in the case study. Effects of climate change, such as droughts or storms, do not seem to have a direct effect on the water use in hotels. However, effects of climate change and their threats can lead to awareness campaigns being organized by organizations or governmental institutions, which, in turn, would lead to an increased awareness in both the sector and among tourists, which could eventually lead to a greater demand for hotels who take measures to reduce their ecological footprint. So, in this way, climate change effects could definitely have an (indirect) effect on the individual hotels. This turned out to be true in the case of Rimini, as “measures to reduce the ecological footprint” were mentioned as an influential ecological factor (case study ECOL2).

The next important cluster is the Economic cluster. A factor mentioned by both the literature study and the case study was the “water tariff”, especially changes of the tariff (lit. study ECON1) (case study ECON1). As the main goal of a hotel is to make profit and increases in costs will have a negative effect on this, an increase in the water tariff can cause hotels to adjust their water-using behaviour.
A factor that was not explicitly mentioned in the literature study but that became very clear in the case study was the water-using behaviour of the tourists (case study ECON2). Hotels mentioned that they had limited control over the amount of water used within the rooms, as the tourists decide themselves how often and how much water they use. The hotels can try to influence their behaviour by putting up signs in the rooms to increase the awareness, an example of this being the signs in many hotels that ask you to throw only the towels that need to be washed on the floor, but hotels cannot fully control how much water tourists will end up using.

Another factor that was often mentioned in the case study was the factor of the indirect costs of water use (case study ECON3). In the literature there were a few articles mentioning the costs of energy use that come with using water, but not so explicitly that it showed the article clearly thought of this as a very influential factor. According to the hotels interviewed in the case study, however, it was. According to many hotels, these extra indirect costs that came with the usage of freshwater, such as the costs of energy or chemicals to clean the swimming pool were economically of more importance than the actual water price. The factor of "potential for improved market share" (lit. study ECON4) was not mentioned by the hotels themselves, and when asked about it, it seemed like they had not really considered it this way. In the opinion of some hotels, tourists are being at the destination to relax and are therefore not interested in the ecological aspects of their hotel.

The Socio-cultural cluster was also established as being one of the most influential clusters. The literature stated that the level of awareness, both within the sector (lit. study SOC1) and among the public (lit. study SOC2), would have an influence on the water-using behaviour of hotels. This is connected to the two socio-cultural factors mentioned by the hotels in the case study, which were "the mindset of the hoteliers" (case study SOC1) and "the mindset of the tourists" (case study SOC2). The difference in the words "awareness" and "mindset" is interesting. This could indicate that, according to the literature, being aware of the problem will automatically mean that you will care, and that you will adjust your behaviour accordingly. The results from the case study, however, could indicate that being aware is not enough but that you need to have the corresponding mindset in order to be willing to make actual changes in your behaviour. If you interpret the socio-cultural factors from the case study in this way, you can then also connect them to the factor of "perception of the seriousness of the problem" (lit. study SOC3); your mindset will most likely influence the way that you will perceive the seriousness of a problem, and vice versa.
The factor "mindset of the tourists" from the case study also connects to the factor "behaviour and attitude of the tourists" (lit. study SOC4); their mindset will have a large impact on their attitude towards certain topics and on their behaviour.

For the next comparison, we look at the Political clusters. Here, we can see a difference between the literature and the case study. Where the literature is focused on the types of policies implemented by the government and whether they focus on the supply (lit. study POL1) or the demand of freshwater (lit. study (POL2), the hotels in the case study viewed regulations (case study POL1) and subsidies (case study POL2) as the two most important political influences. However, the lack of regulations on water use in Rimini already indicates that the government is not as focused on managing the demand but more on the management of the supply of freshwater. This was confirmed in an interview with Emanuele Gallone from HERA S.p.A. (22-05-2019) where it was said that the government, in a time of freshwater shortage, would first look to extra sources of freshwater and would only implement regulations on the water use during times of a serious water crisis. However, these results from the case study stating that the government mostly focuses on the managing of the supply only says something about the situation in Rimini and this could be different in other destinations in the Mediterranean.

A cluster closely related to the Political one is the Legal cluster. The factor "legal tools" (lit. study LEG2) could also be recognized in the results of the case study, such as the factors

“orders” (case study LEG1) and “penalties” (case study LEG2). However, the factor “regulatory issues” (lit. study LEG3) is also related to the factor “orders” from the case study, but in a different way. From the case study it became clear that some hotels did not take the orders very seriously, as they thought there was not adequate control anyway.
An interesting factor that also came out of the case study was the factor of “the blocking of water-saving technologies” (case study LEG3). The literature on this topic is mostly focused on measures that governments or municipalities are already taking to actively influence companies, such as hotels, to actually start saving water. This factor from the case study is therefore an example that it cannot be assumed that governments will automatically stimulate water-saving measures in hotels, or at least under certain conditions.

If we look at the number of influential factors between the clusters, we can see that in both the literature study and the case study the technological clusters are the least extensive as they contain the least number of factors. In the case study, this cluster was also thought of by the hotels themselves as being the least influential cluster on their water-using behaviour. The literature on this factor mostly zoomed in on the technological innovations that could provide new options for saving water (lit. study TEC1), but also on the lack of technical capacity and knowledge in some destinations (lit. study TEC2) which can result in efficient water-saving technologies that are not being implemented or used properly. This shows a resemblance to the results from the case study, where it was determined that some hotels make use of technologies regarding water – for example technologies that measure the amount of water being used – but not with the goal of “saving water”, which these technologies could also be used for (case study TEC).

To summarize, there are some interesting differences between the results from both studies, but there are more similarities which confirm the influence of certain factors.

# 5. Discussion

From the results, several things become clear. First, all 6 PESTEL clusters are represented by influential factors in both the literature study and in the case study. A number of similarities between the results of both studies are detected, as well as some interesting differences. Besides this, a few factors were identified in the literature study that did not fall under any of the PESTEL clusters, even though these showed to be influential on the decision-making process of hotels concerning water use. This indicates that the PESTEL model might not be comprehensive enough for this topic of research, as it failed to capture all different influential factors among its existing clusters. As I was aware of the possibility of other, external factors since the beginning, I used the PESTEL model primarily as an initial framework instead of a complete model I had to follow. This is also why, in the model in figure 8, based on the results of the literature study, there is an extra cluster added for "other factors". However, in figure 9, which is the model constructed through the results of the case study, there is no extra cluster. This is because from the case study, there were no results showing any influential factors that did not fit under any of the already existing clusters. So, why were there extra factors discovered in the literature and not in the case study? One explanation could be that because the PESTEL model was used as a framework for the questions that were being asked to the hotel's representative, more emphasis was automatically put on these clusters and the attention for possible external factors was limited. During the case study, the review of the literature study containing the extra factors was not completed as yet. Therefore, I was unable to use these as examples and test how influential these other factors would be perceived in the case study area. Even though this certainly forms a limitation to the results of the case study, it does not take away that the factors that were mentioned by the hotel representatives are for a fact influential to their water-using behaviour. The only limitation here is that there could be even more influential factors than the factors that were discovered through this case study, and that the PESTEL model might be useful to act as a framework but that it is not complete enough to follow blindly without taking possible external factors into account.

Going back to the literature study, a big obstacle I encountered in the beginning was finding useful literature. It turned out that information about influential factors on the decision-making about water use of hotels was actually available, however the main source of this information turned out to be articles that focused on water use in hotels and its management. After finding some articles that provided information about influential factors to this process, I was able to dig deeper into this information by examining the references they had used and selecting the most useful sources. This turned out to be the most effective way of building a complete literature review.
Another limitation during the literature study was time. Therefore, I might not have been able to identify and examine all relevant literature that was available. Nevertheless, the literature study that was conducted revealed influential factors in all the PESTEL clusters and, in addition, some other factors. Therefore, I believe that even though I might not have included all the influential factors that are examined in the existing literature, I am still able to provide a relevant list of influential factors on the decision-making process on water use of hotels.
A third limitation to the literature study was that most literature that could be found on the situation of water use in the Mediterranean was focused on Spain. Even though Spain is one of the most popular countries for tourists in this European region, it should be noted that the

information from the literature is not always applicable to the entire European Mediterranean region.

A limitation that is related to the case study is the fact that out of the 39 hotels that were approached to participate in the study, only 12 hotels (31%) agreed to an interview. There are a few reasons for this low response rate. First of all, the period in which the case study was conducted was in May 2019, 9 – 27 to be exact. This is the start of the tourism season in Rimini, which means a lot of hotels were either still closed or already in full preparation for the high season, in which case they were often busy with getting the hotel ready for full operation. This meant that some hotels that were approached simply responded that they were too busy to provide a full interview. After the initial plan to conduct only in-depth semi-structured interviews of around 30 minutes, the strategy was adjusted to also include structured interviews of 10-15 minutes. This was done as an attempt to increase the response rate, which seemed to work as hotels were less hesitant to agree to a short interview. Another reason for the low response rate could be that many hotels felt that participating in this project would be an investment of time while it would not lead to any direct (economic) benefits for them. Besides that, managers of hotels could feel hesitant to share information about their hotel's practices, even if they were aware that the information would be analysed anonymously. It was probably due to a combination of these reasons that the response rate in the case study was low. In a destination that counts over 1000 different accommodations, of which most are hotels, this sample of 12 hotels is limited and might be biased due to the response rate. It should therefore be understood that the results of this case study cannot be considered a representative sample for the hotel sector in the destination, let alone for the European Mediterranean as a whole. They should rather be interpreted as initial indications of the situation and they can provide a building block for further research on the topic of influential factors on water use in hotels, especially in European Mediterranean destinations.

Another limitation that I discovered while being at the destination of the case study was that the availability of data on water use in Rimini is limited. I was able to find out that the amount of water used by big consumers, including hotels, is being monitored on a monthly basis. These numbers are, however, not available to the public. Not even when they are made anonymous. During my interview with HERA S.p.a. (22-05-2019) I was also told that they could not share certain data with me. Although I can understand why this is done, it limited my research as it made it difficult to get a clear picture of the overall situation in Rimini.

If we take a look at the results that came out of the case study, there is a surprising aspect. The fact that the Ecological factors were considered by the hotels to be the most influential contrasts with the reality that only a very small number of the interviewed hotels are already actively taking measures to reduce their ecological footprint. For the few hotels that were taking these kind of measures, other factors than ecological ones – for example, the economic or the socio-cultural factors – were mentioned as being the main motivation behind these measures. A reason why the ecological cluster would still end up being ranked as the most important factor could be for a few reasons. The first explanation could be that the hoteliers feel that if they rank these factors to be less important, their hotel could be seen as being "un-eco-friendly", which could possibly harm their reputation. Even though the hotels were aware that the data would be processed anonymously, the fear of potentially harming their reputation which could lead to negative economic effects could still be a driver

for hotels to exaggerate their attention to ecological factors. Another explanation could be the fact that many hotels mentioned that they were not implementing water-saving measures at the moment, but that they were interested in investing in water-saving measures in the future. How near that future is and whether they will actually initiate the implementation water-saving measures can, of course, not be said with certainty. However, it could be that hotels feel the pressure from the increasing awareness in the tourism sector about environmental consequences of tourism activities and feel like these ecological factors (in relation to socio-cultural and economic factors) are becoming more and more important to consider.

Considering all the above, it becomes clear that more research is needed on influential factors on the water-using behaviour of hotels that go beyond the factors included in the PESTEL clusters, so that a better-fitting model can be designed.
Besides that, more research is needed on actual use of freshwater as well as on the factors influencing the underlying decisions in destinations, to be able to collect new insights and to arrive to conclusions that are more representative for the entire European Mediterranean region.

# 6. Conclusion

The tourism industry is highly dependent on the use of water and is becoming a growing consumer of freshwater in many destinations in the European Mediterranean, which can put severe stress on the available freshwater resources. Increasing the supply is expensive and not always sufficient. The need to pay more attention to the demand-side of freshwater is becoming more and more urgent. To be able to implement efficient policies which can influence the demand, information is needed on the factors to which the end-users will respond in terms of their water-using behaviour and the decisions they make about this usage. The aim of this research therefore was to find out which factors influence the decision-making processes about water use in hotels in the European Mediterranean. A literature study and a case study were conducted, both making use of the PESTEL model as a conceptual framework to help identify the influential factors. The PESTEL model is often used to analyse the environment of a company and includes contains political, economic, socio-cultural, technological, ecological and legal factors within that environment that could be influential to the company itself.
After both studies were completed, their results were processed into two different models, after which these models were compared.

An important element that was explored was how water is used within hotels. It was discovered that hotels use freshwater for various purposes, both directly and indirectly. This variety of uses complicates the determination of the actual water use of a hotel.
Another part of the research was conducting the literature study to determine what was known in the literature about influential factors – both factors that connected to a cluster from the PESTEL model and other factors – on the hotel's water usage. It turned out that all clusters of the PESTEL model have influential factors. However, some were represented by more factors than others and some are more influential than others. The PESTEL clusters containing the highest number of influential factors, according to the literature examined, are the ecological, economical and socio-cultural clusters. All three of these clusters turned out to have at least 4 influential factors. This connected to the results of the case study which showed that the ecological, economical and socio-cultural clusters made up the top 3 of influential clusters as ranked by the hotels themselves. A lot of factors actually turned out to be influential not only to the decision-making on water use of hotels, but also to each other; they would reinforce or weaken each other's influence on the hotels. There were also some factors that were difficult to put into one cluster, as they could fit under multiple clusters. There was also a considerable number of influential factors established by the literature study that did not fall under any PESTEL cluster. These were included in the model under the cluster "other". These factors are no less important than the PESTEL factors and should not be overlooked.
In the comparison of the two models of the different studies, some similarities just as some differences can be found. The biggest similarity could be found between the socio-cultural clusters in both studies, where the mindsets of both the hotels as well as the tourists was considered to be influential factors on the water use of hotels. The biggest difference in the results was between the political factors in the two studies. Here, the literature was mostly focused on pro-environmental policies and green initiatives implemented and promoted by the government, while the hotels in the case study believed that saving water was not a priority for the government and municipality.

From the results of both studies, it becomes clear that there are many different factors – either from PESTEL clusters or from other fields – that have an influence on the water usage of hotels and on the decisions they need to make regarding this usage. The most researched factors in the literature, which were the ecological, economic and socio-cultural factors, were also ranked as being the most influential by the hotels in the case study area. These results show that if governments, institutions, organizations or other stakeholders that try to influence the water-using behaviour of hotels, they should focus their measures primarily on these three clusters and their factors, as they are shown to be the most influential on this behaviour. However, they should not overlook factors from the political, legal and technological clusters, as well as the factors that were not organized under any cluster, as these are still shown to be influential factors and could be at play depending on the situation in the destination. Even though destinations within the European Mediterranean can share similar circumstances such as climate, culture and politics, they can also differ in many aspects such as weather, environment and awareness regarding environmental issues. It is for this reason that it is important to consider that one can form strategies for influencing the water-using behaviour of hotels in this region, but that one should prevent implementing one complete strategy in every destination, as changes between destinations can cause different influential factors which require different measures.
By better understanding the different uses of freshwater in hotels and by knowing on which factors to put the most attention in every destination, better strategies can be formed to change the water-using behaviour of hotels and, eventually, reduce their ecological footprint, at least when it comes to freshwater usage.

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# Appendix

## English translation of the order regarding regulations on water use from the mayor of Rimini: 2011-2012

Comune di Rimini

Headquarter of infrastructure, mobility & environment.
Administration of quality, environmental service & security.
Adres: Via Rosaspina 7
tel: 0541-704985

Rimini, 28th of November, 2011
Prot. n. 175876

On the order of the town hall - Hydric emergency - Limitate the use of freshwater in the municipality of Rimini until the 31st of May 2012.

THE MAYOR

Seen:

- the law (DPCM) of the 4th of March 1996 (published in the official paper of laws on 14th of May) “guidelines about water resources”. In particular chapter 8.2.10, that says; in the case of scarcity of water resource, the adoption of measures towards the limitation of the use of freshwater when its not needed, and the saving of it.
- The law - (L.R.) nr 1/2005, art. 8 - declares the state of regional freshwater crisis until the end of May 2012 in the territory of the municipalities of Forli-Cesena, Ravenna & Rimini.
- The president of the region Emilia Romagna - with the law nr 214 of 22/11/2011 - states that extraordinary measures to decrease the waste of freshwater were taken in the territory of the municipalities of Forli-Cesena, Ravenna & Rimini to face the freshwater crisis that is going on. This means that the mayors of those municipalities will have to release urgent laws containing at least minimal measures written in this law taken to avoid freshwater waste and to ensure the necessary saving and rational use of freshwater.
- The document from the president of the council of ministries - protocol 67/2007 of 05/03/2007 - brings operative guidelines to face possible freshwater crisis, so that when it happens, it is necessary that the activities of prediction, monitoring & pre-announcement will come together with strong and efficient action of prevention, mitigation & fighting against, that if planned in time, could reduce drastically the possible effects of freshwater crisis on the population, on the farms & on the productive system.

Taken awareness of the document prot. n. 2200/area V^ of the Environmental office of the municipality of Rimini - Area V^ - Protezione Civile (civil protection), Difesa Civile (civil defense) & who coordinates the public rescue, which states that the regional agency of civil protection with the document n. 072/2011 activate a phase of pre-alarm because of critical issues regarding the water pipe system, and the recommend to keep doing the actions that started during the phase of monitoring (as mentioned before). With a particular attention to the progressive weighted decreasement of withdrawal from Ridracoli dam, and to the activation from Romagna Acque of additional freshwater sources. These sources have to be declared by the authority in charge that they are complementary to the Ridracoli area.

Consider that the weather forecast in the medium term (data from ARPA SIM) seems to predict the upcoming of scarce amounts of rain, summed up with the actual low level of the water of Ridracoli dam.

Revealed the necessity and the urgency of adopting a series of extraordinary measures focussed on administrating in a more effective and homogeneous way using the freshwater resources available to guarantee to all the citizens the possibility to satisfy their prime needs mainly for food, domestic & hygienic use.

Considered that the situation imposes the adoption of urgent measures with the aim of avoiding bad consequences on collective interests.

Considered the nature of contingency & urgence, to preserve the majority of available resource for human use and for food use and to reduce, as a consequence, the withdrawals of freshwater from the public aqueduct of Rimini, for other aims besides the primary ones.

Seen art. 98 of law n. 152 of 03/04/2006 "environmental guidelines" that states that people that manage or use the resource of water have to adopt the necessary measures to avoid waste of freshwater and implement the reduction of its consumption.

Seen art. 50 of law n. 267 of 18/08/2000 "Unique Document about how Local Entities have to deal with their obligation".

Seen law n. 689 of 24/11/1981 "Changes on the sanctionatory and punishment system" and art. 7-bis of law 267/2000 "administrative sanctions".

ORDERS

Starting from today until the end of May 2012, without any exception in the timetable, it is forbidden to use water for

- irrigation of (vegetable) gardens, soccer fields made of natural grass, tennis courts, public gardens & parks.
- domestic washing of cars & motorbikes.
- the filling of partial filling of swimming pools, decorative fountains, ponds in the garden and the working of fountains with a continuous flow of freshwater.

ORDERS

To the managers of the hydric service and to the manager of the monitoring service of the public nature (parks, etc.) to close the decorative fountains until the 31st of May 2012.

WARNS

That failing to obey to these orders will lead to a sentence regulated by law of a fine between 25 & 500 EUR. and the fine will be charged to the management of the place where the orders were broken. Knowing the maximum possible sanction, the administrative fines will be chosen taken into account each specific violation & the proportion of it with respect to the degree of how bad the situation is. With this same document, necessary measures will be adopted with the aim of guaranteeing that monitory checks about respecting the orders given in this document, will be done with regularity and efficiency by the police of the municipality.

REQUESTS

that this document will be transmitted to the municipal police and to the headquarters of the Carabinieri and to the municipal security of Rimini headquarters to control and check possible violations to these orders;
and the document asks to be transmitted also to:

- the ministry of Env. that also takes care of territory and sea;
- the region of Emilia-Romagna, regional agency of civil protection;
- the region of Emilia-Romagna, for service to preserve & recycle water;
- the office of the national government placed in Rimini;
- the headquarter of the forestal police of the province of Rimini;
- the province of Rimini, environmental service;
- the A.T.O. of Rimini;
- HERA SpA in Rimini;
- the firm Romagna Acque;
- the ARPA of the province of Rimini;
- the municipal civil protection of Rimini.

In the case of changes on the climate & weather condition which could lead to a better situation than the actual dry situation, and to a bigger availability of water, the present document could end earlier than stated, with the permission of the president of the region Emilia-Romagna.

IN OPPOSITION

if you don't agree with this document, this document could be presented in front of the TAR (kind of court) within 60 days from the date of issue of the actual document. Or, in alternative, you can ask for an extraordinary appeal to the head of the state within 120 days.
The present document is issued to the citizens through press communications and it is placed in the Albo Pretorio (register for laws) and it will also be placed in public, until it will become invalid or expired.

Signed, the mayor (Andrea Gnassi)