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The use of resources and the green purchasing gap.

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In our previous posts on the conscious customer and the creation of customer value we discovered that the use of resources greatly impacts a customer's value creation. Further, resource use impacts the green purchasing gap . But how can we illustrate the gap? Let's start by describing the use of the three natural resources air, water and energy along the tourism value chain. Interestingly none of these three resources can be used without influencing or being affected by another. For example energy production influences the quality of air by the emission of pollution. Air makes the hydrological cycle possible. Water is used in the production of energy for cooling purposes or in the production of hardware needed for renewable energy installations. According to the kind of energy produced water consumption in the production varies (Gössling, 2015). Then again, energy is needed to provide warm water. Water is needed to water gardens and trees in order for them to sustain and to generate fresh air. Air, more specific wind, is needed to generate wind-energy. A cycle!

Research Summary

The following paragraphs will give a detailed overview on to what extend tourism uses the resources water, energy and air along the tourism value chain.

Allocation and availability of water in tourism

The resource water is a very essential element for tourism, especially fresh water. Gössling (2015) explains that water is consumed directly or indirectly, embodied or global, by tourism. In addition, literature highlights recent studies' outcomes that the water footprint of indirect, embodied or global, water consumption appears to have a greater significance than direct, local, water consumption on its own (Cazcarro et a., 2014; Gössling et al., 2012).

As the table visualises water is used throughout the tourism industry. The usage is measured in litre per guest night and is differentiated between direct and indirect tourist consumption. The highest consumption can be dedicated to the indirect water use by food consumption. The second highest amount is needed for the production of biofuels which

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are used as an energy source in tourism. The lowest amount of L/guest night used can be detected when looking at the infrastructure provided by the destination. According to this table tourists have the biggest direct influence on water consumption with their choice of accommodation and their behaviour throughout their stay. The tourist's biggest influence on indirect water consumption can be seen in regard to the choice of food.

Water use category - direct	**Mni-max L/guest night**	**Estimated average L/guest night**
Accommodation	84-2425	350
Activities	10-875	20
Water use category - indirect	**L/guest night**	**Estimated average L/guest night**
Infrastructure	0,2	0,2
Fossiel fuels for transport	5-2.500	130
Energy use at hotel	0,3-200	75
Biofuels	2.500	-
Food	4.500-8.000	6.000
Other consumption	n.a.	n.a.
Total (direct & indirect) per tourist/guest night	**4.600-12.000**	**6.575**

Source: Own drawing (2015), according to Gössling et. al. (2012).

Water use by tourists is stated to be considerably higher than the use of water by resident consumers. It can be specified that water consumption by tourists in developed countries is calculated to vary between two or three times that of local water demand (Garcia & Servera, 2003). In addition, when considering tourists' water consumption in developing countries the usage exceeds up to 15 times the local water demand (Gössling, 2001). Page et al. (2014) explain, by using Goa in India as an example, that residents consume 14 litre per person per day whereas tourists consume an average of 1,785 litre per person per day (Tourism Concern, 2012). Gössling et. al. (2012) highlight that irrespectively to the number of guests a fix water use needs to be maintained for pools, gardens and cleaning. Therefore, a distinction between fixed and variable water use, for example laundry or taking showers by the guest, needs to be made.

Further it is important to emphasise the scarce water availability and the issue that water consumption cannot be as easily offset as carbon offsetting is possible (Page et al., 2014). Gössling (2015) points the need of respecting and including a region's specific

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water situation in the tourism product development out. Especially as tourism's peak season is generally a region's driest season, tourism generates additional high water pressure in times of its most limited availability. In addition, the region's accessibility in regard to renewable water supplies as well as climate change scenarios needs to be taken into account. Renewable water resources need to be considered due to the fact that fossil or desalinated water is not considered sustainable (Gössling, 2015). Next to the consumption of water as such, water is an important resource in the production of fuel and especially in power generation involving fossil fuels (Gössling, 2015). However, according to Kuoni (2013) it can be stated that evidence suggests a cost-efficiency due to water management.

In summary water in tourism is a scarce resource. It is consumed and a prerequisite while providing transportation, accommodation, food, man-made attractions, landscaping as well as wellness facilities.

Allocation and availability of energy in tourism

Energy in tourism is needed for transportation services as well as for service provision by accommodations. Further, energy is needed to transport raw materials, for example coal, to the energy production plants. The energy used for accommodation purposes can be measured in MJ, kWh or L of fuel (Gössling, 2015). As said in the previous post, the use of energy has an influence on the water consumption. However, water embodied in energy consumption will vary, depending on the source of energy used, i.e. electricity generated from fossil fuels, coal, gas, nuclear or renewables, as well as the amount of fossil fuels burnt in boilers, cars, etc. In summary literature suggests the tourists' direct energy use varying between 3.5 MJ and 1,536 MJ or the equivalent of 0.1- 42.2 L diesel per guest night (Gössling, 2010).

Peeters (2013) summarises the amount of energy used per tourists traveling an average global return distance of 1,898 km in 2010 to an energy use of 1,123 MJ/km. As discussed in the previous chapter, this fossil fuel use can further be translated into a global average of 130 litre of water per guest night caused by the fuel used for transportation.

Next to energy generated by fossil fuels, coal, gas or nuclear energy, the renewable energy gains popularity. The term renewable energy refers to resources such as wind, hydro, solar, biomass, ocean energy and geothermal energy which are renewable. Using

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these forms of energies does little or no harm to the environment and is simple to develop (Chaoqun, 2011).

Even though the use of biofuel in tourism appears still very limited, the linkage to water consumption must not be underestimated. Gössling (2015) highlights the possibility of using biofuels as a sustainable fuel option in tourism transport. However, this would increase the water footprint of tourism to a very wide extend as water is crucial in the production of biofuels. UNESCO (2009) states that 1 litre of liquid biofuels embodies a global average of 2,500 litres of water. Further Hadjikakou et al. (2013) pay attention to the fact that “sustainable“ energy options such as biofuels or desalination represent so called water trade-offs. They state that due to this the trade-off effects need to be considered before taking actions. Gössling (2015) emphasises solar thermal and photovoltaic installations as an additional “sustainable“ energy generation option, which does not have an increase of the water footprint as a consequence.

Roselló-Batie et al. (2010) highlight another crucial energy consumption in tourism. They state that 70% – 80% of the total energy use in tourism is generated while constructing hotels and other tourist buildings. Moreover a fifth of the overall CO2 emission is caused by the manufacturing of materials needed in the constructions. Additionally, they claim that the main cause for CO2 emission while constructions is caused by the regional energy system as the system might be based on coal or fossil fuels.

In summary energy is a crucial element in tourism, depending on the resource water and influencing the quality of air. Next to conventional energy, renewable ways of energy production exist, which display options for minimising water use and air pollution by energy production and consumption in tourism in the future.

Allocation and availability of air in tourism

In the literature the resource air has not found a great importance yet. However, in the tourism context air is needed as a prerequisite for tourism services and products.

According to Stefănica and Butnaru (2015) 60% of the air trips realised refer to tourism. Therefore, the transportation system and the use of energy, producing emissions harming air and increasing global warming, have to be considered. Further, alternative ways need to be discovered and embraced. Moreover, Stefănica and Butnaru (2015)

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stress the phonic pollution by air transportation or road traffic, which impacts on stress levels and hearing abilities of tourism stakeholders.

Since fresh air is seen to increase health and wellbeing, tourists' as well as locals' mental and physical health is endangered by pollution (Hall et al., 2010). Further, it can be stated that fresh, clean air is a motivator for tourists to choose a certain destination as clean air might not be given in their city of origin (Tourismus Monitor Austria, 2011/2012).Great air quality is generated and fostered by plants and trees, therefore tourism can increase and improve the resource air by respecting the environment. For example by not decreasing the amount of trees in regions due to constructions of tourism buildings. Wind is also recognised as a valuable energy resource by making heating and electricity supply environmentally friendly as well as easily accessible in tourism regions (Chaoqun, 2011).

In summary, as air is invisible most of the times and everywhere accessible there seems to be no limits to the consumption of air in tourism. Nevertheless, air quality determines to a great extend the value of the tourism product by various variables.

What does this mean for the tourism industry?

This extensive research summary displays the use of natural resources in tourism and along all stages of the tourism value chain. It becomes evident that water, energy and air are essential to all tourism services and need to be managed and looked at closely in order to match conscious customers' needs. It is important to note that the availability and the gathering of data on a resource use is not easy at all. So starting by gathering information for your specific tourism facilities is the first step in managing your services resource use in a responsible and conscious manner. Try to monitor your resource use according to season, customer and other variables which are important to your operations. Monitor, compare, assess and identify your operations average resources use. Knowing your consumption serves as the starting point! Don't be mistaken, we are aware that tourism services consists out of more resources than the three discussed above. Further posts will include other resources like labour and cultural components. So stay tuned and enjoy this incredible richness of the topic.

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The individual resource use of a tourism provider is dynamic and can be adapted. What should an adaption look like? Stay tuned for our next post displaying ideas on how to narrow the gap by managing the resources used.

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