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Food water footprint for hotels as a tool for sustainable water management

Exploring challenges and consequences

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Abstract

Water is a crucial resource for our planet and a part of the accommodation sector´s environmental management. So far most attention has been paid to the direct water use such as for guest bathrooms, swimming pools and irrigated gardens. There is however also an indirect water use trough food and fuel consumption which has not been a focus for hotels environmental commitment but appears to stand for a significant part of the total water consumption. For successful environmental management are appropriate indicators of necessity. The concept of water footprint deals with direct as well as indirect water use for e.g. food products and reveals together with an assessment of local conditions the environmental impacts.

This study focuses on the indirect water use of hotels trough their food consumption and explores possibilities of developing a food water footprint (WF) as a way to measure and manage this indirect use. The research question concerns which challenges might be involved in the process for a hotel to develop a food WF and as well which possible consequences for a hospitality organisation to implement a food WF there may be. This includes a discussion if a food WF would be an appropriate indicator for hotels indirect water consumption trough food and possible ways of its utilisation. To gather data two semi-structured interviews are held, one with the owner and another one with the executive chef of a hotel with restaurant facilities. In addition are as well four documents of cases where water footprint has been used to improve water management analysed.

One conclusion from the empirical data that can be made is that it appears to be several challenges for a hospitality organisation to calculate their food WF. There seems to not be sufficient existing information from suppliers, and to conduct the calculations for hotels themselves tend to be complicated. A possibility to raise awareness regarding the importance of the indirect water use trough food might exist in using standard values of water use for victuals. To use a food WF for external comparison appears to be difficult but it might be useful for comparing internally. Development and applying a food water footprint seems to meet several challenges but do open possibilities to improve a hospitality organisation's water management and thereby their environmental performance.

Key words: hotels, indirect water use, food, water footprint, sustainability, tourism

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1 Introduction

1.1 Background

Availability to fresh water is a global challenge and several water stressed areas exists in the world, causing severe problems for humanity (UN, 2011). At regional level an adaption to existing water conditions is crucial for all sectors, identified by Mukheibir (2010) as adoptive water management. Different sectors of human activity have different impact and contribution to water use. The importance of water issues assume to increase because of climate change and population pressure and areas that are already dry are expected to get even less precipitation (UNWTO, UNEP & WMO, 2008).

Gössling et al (2012) discuss that in addition of contributing to water consumption the accommodation part as well as the tourism sector as a whole is also dependent on freshwater resources for direct use such as for swimming pools and in guest rooms. There is also a dependence on indirect water use which exist trough production of food as well as fuel, which are both highly consumed within tourism business. Accommodation and hotels in particular stands for a major part of the tourism sector's contribution to water consumption (Deyà Tortella & Tirado, 2011). Scarcity of nature recourses is as well a factor of the external environment to which organizations must learn to adopt for ensuring future successful performance (Mullins, 2001). There is also a growing interest among hotels to perform environmental management where water consumption is included and environmental commitment can be one way for hotels to improve their image (Bodhanowicz 2006, Oh & Pizman, 2008).

So far has the major part of the accommodation sectors water management focused on the direct water use which also is more easily measured and managed. The awareness of the significance of indirect water use is however rising and appears to stands for a greater part of the total water consumption of many hotels than the direct use. Food consumption at hotels is a part of the indirect water use and which food products served affects the hotels total water consumption (Deyà Tortella & Tirado, 2011; Gössling et al, 2012). Food related issues are also likely to get greater relevance for tourism organizations because of an increasing all inclusive trend where more meals are served at the hotel (see e.g. Anderson, Juaneda & Sastre, 2009).

As discussed in Gössling et al, (2012) an indicator for water use as a complete life cycle analysis regarding direct as well as indirect water use needs to be developed for the tourism industry in order to manage also the indirect consumption. A need of more tools environmental management in the hospitality sector to achieve successful performance is also identified by Bodhanowicz (2006). Water footprint is a concept by Hoekstra (2003) highlighting the need of considering both direct and indirect water consumption to devlop a complete indicator of water use. For calculating a water footprint of food and thereby environmental impacts it is of necessity to consider kind of food items as well as location and method of the food production, which all determine the quantity of water consumed and the severity of the water use. The global average water footprint for producing one kilogram of beef is for instance 15500 litres of water while the same number for chicken is 3900 litres (Hoekstra, 2008). In earlier research there has been little attention paid to how food consumption can be measured as a part of an indicator of a hotels water use and is therefore were this study is aiming to contribute. More specific the study will explore challenges and consequences of food water footprint since this concept appears useful to measure and mange indirect water use of food consumption in the accommodation sector.

1.2 Research question and aim

The aim of the thesis is to discuss which challenges are implied in the development of a food water footprint as a tool to improve hotels environmental performance.

On the basis of the aim, following research questions are asked:

- What are the challenges in developing a food water footprint for a hospitality organisation?

- What are the possible consequences for a hospitality organisation of developing a food water footprint?

The first question aims to cover a discussion of how a procedure to measure the indirect water use in food consumption could be developed. Potential difficulties in this development as well as evaluation of impacts of a water footprint are intended to be explored. Discussing

possibilities to measure a water footprint of food consumption will contribute in answering if it is reasonable to adopt for a hospitality organisation, or if too much complexity and uncertainties are implied within the process.

The second question intends to initiate a discussion how a food water footprint can serve as a tool for environmental performance, thereby explore negative but well as positive consequences and which difficulties in utilization that may exists,. This discussion will consider the findings from the first question. On the basis of time limitations, in more detailed discussed below, this study is not expected to present explicit answers but aims to initiate the discussion and highlight critical points for further research.

1.3 Scope of study

The area of the study is the tourism industry but focuses mainly on hospitality organisations. This study focuses on development and implementation of a food water footprint based on the restaurant facilities in a small hospitality organisation, Slussens Pensionat but as well in a general perspective. A food water footprint can be considered as a part of a whole water footprint (WF) which includes both direct and indirect water use (Hoekstra et al, 2011). Since direct water use is relatively easy to measure in a hospitality organisation trough hotel meters, this will be left out in this study and instead focus on the indirect water use of food. Indirect water use from fuel consumption is neither included in the scope of this study due to time restriction. This study focuses on hospitality organisation where food services are one among several offered services in difference from a restaurant where the food is the main service. The result might however be applicable to some extent on restaurants.

For discussing challenges in developing a food WF two semi-structured interviews are held with respondents at the hotel and four documents of WF cases are analyzed. The study will have an explorative approach and discuss possible challenges for measuring a food WF in the case of Slussens Pensionat. The discussion covers possibilities of measuring, but no conducted calculations for determining the food WF. For this study, it would have been an advantage of attempting to calculate a food WF but it is not performed because of practical issues and time. More comments regarding this is presented in methodology reflections section 3.5. Further, the goal is not find out about relations of problem with implementation and characteristics of hotels such as size, type and chain, because it is not of focus of in the research question and there is as well too few respondents to say anything about that.

This study issues about implementation of a food WF. This involves potential difficulties of implementation as well as possible ways of utilization of a food WF as a tool in a hospitality organisation. Questions regarding the implementations as well as the development are discussed in the case of Slussens Pensionat but as well in wider perspective. It is a case of a small hospitality organisation with certain characteristics and there may therefore be limitations on translating the result to any facility within the tourism sector serving food. The documents are helping for making some parts of the result easier to generalize and certain issues are more likely to be transferable.

It is crucial to identify service related benefits of trying to reduce water consumption and environmental commitment in general since efforts and resources often are required. This is however not largely included in the scope of this study. Motivational factors for business to improve management of indirect water use from food are touched upon but a deeper discussion is due to time limitations left for further research.

1.4 Disposition

The introduction chapter is followed by chapter 2 that contains the theoretical framework of this study. This chapter is constructed in three parts and first is a background of water management in tourism to be presented. Following comes the second part which includes a presentation of the water footprint (WF) concept and food WF, followed by the third part about environmental performance including tools and indicators as well resistance to change. After chapter 2 comes chapter 3 which is the methodology chapter. The methodology approach as well as semi-structured interviews and documents are presented. This chapter includes as well a section about qualitative content analysis which is the analyse approach of the empirical data and methodology reflections are presented in the end of this chapter.

The empirical findings are presented in the next part which is chapter 4 and the data gathered from the interviews and the documents are here to find. Chapter 5 is called “Development and implementation of a food water footprint” and contains the analysis. In this chapter are empirical findings from the interviews and the documents compared with each other and analysed based on the theories, as from the WF concept and environmental performance. The concluding discussion are presented in chapter 6 followed by the chapter 7 that contains the references.

2 Water and tourism: water footprint and performance

This chapter will give an overview of the theoretical framework of this study. A background for tourism and water management will be given as a start followed by a section about food water footprint. The third part of the chapter presents issues of environmental performance such as tools and indicators as well as resistance to change.

2.1 Water management in tourism

Dependency and contribution

The tourism sector is dependent on freshwater resources but is as well a sector which is water intense in its products and services (Gössling et al 2012, Kelly & Williams, 2007). Access to nature resources is also mention by Bodhanowicz (2005) as a crucial factor for development of hotels and tourist destinations because of recourse intense services, while tourism at the same time is a threat to the resources it is dependent on. Tourism requires fresh water in tourist infrastructure as irrigated gardens, swimming pools, guestrooms, golf courses and laundry. Also is water resources in rivers and lakes used for different tourism activities like swimming and kayaking (Gössling, 2006). A destination or a hotel is as well dependent on freshwater for indirect water use in food and fuel production where considerable amount of water are needed (Gössling, 2012, Kelly & Williams, 2007). In addition to water consumption tourism also contribute in decreasing the water quality by generating waste water and pollution (WWF, 2004). According to Kelly and Williams (2007) bad water quality as well as water shortages can diminish destination image which all the actors are dependent on. A negative impact on the image will attract les tourists to the accommodations and activities on site.

Even when excluding the indirect water use tourism consume a large quantity of water. Different studies regarding how much water a tourist uses per day have been conducted and show different result. EEA (2000) suggest that tourist consume about 300 litres per day and up to 880 litres per day for luxury tourism. In addition a tourist generate in average 180 litres of waste water per day. Gössling et al (2012) discuss that literature existing give a range of 84 litres up to 2000 litres of water consumption per tourist per day. For accommodation several different results exist, one study presents a water use of 250 litres per guest night. In general it can be noted that the variations depends on what facilities are connected with the hotel, if there are spa or a large pool landscape. The indirect water use is still not included. In Gössling

et at (2012) indirect water use is however argued to be more relevant than direct water use, since it stands for a larger part, and water use in general is underestimated. A business' indirect water use is often of greater quantity than its direct water consumption (Hoekstra et al, 2011).

Due to population growth and expected effects of climate change there is assumed to be a decrease of water resources in many places (UN, 2011). Tourism will be affected because of its sensitivity and dependence on water resources for both direct and indirect use. At a global level the tourism sector's impact on water resources is not very considerable and destinations and hotels in relatively water abundance areas are less vulnerable. If indirect water use is considered may water use in these cases be of higher relevance since its high amount of water consumption (Gössling, 2006).

Motivational factors

As discussed in Kelly & Williams (2007) a more efficient water use can give less negative impact on the surrounding environment as well as opportunities to reduce operational costs. The economical benefits are however not yet well examined in existing literature regarding indirect water use trough fuel and food consumption. In addition to direct impact on crucial nature resources an efficient water management and general environmental commitment can also help to meet the need of keeping up good brand image (Bodhanowicz, 2005). A study of Andereck (2009) shows that environmentally friendly practices within tourism business are of importance and have high values in consumers attitudes. The actual behaviour in tourist choices is however not included in that study. Attitudes of hoteliers were covered in another study by Bodhanowicz (2005) which shows that hotels environmental engagement is however not a major marketing factor. The respondents were giving points to factors that influence customer decision making and other factors such as *location*, *quality of services* and *price* are of greater importance than concern for the environment. Some studies state that it is hard to determine how much of customers' environmental concerns translate into action. Another part of a company's marketing that can benefit from environmental commitment regardless direct customer awareness is business-to-business marketing. There is a growing awareness within the service industry and many companies are more likely to prefer cooperation with a partner that takes environmental responsibility (Oh & Pizman, 2008).

Oh & Pizam (2008) discuss a need for tourism and hospitality companies to engage in environmental concerns like water consumption but note as well that "business would only change if it makes business sense to do so" (Oh & Pizam, 2008, p 42). In the study by

Bodhanowicz (2005) the hoteliers graded *Reducing operational costs* as the most important incentive for inducing more environment friendly initiatives. As second and third most important was *Demands from customers* and then *Improving the hotel image*. The fact that environment commitment improves the business image is also discussed by Oh & Pizam (2008) and studies show as well that the market of demand for green products and services is growing. This can create willingness for companies to make efforts and accept extra costs. Factors that may contribute in value creation are important to business since as noted in Grönroos (2007) that customers buy the benefits and experienced value in product and services and not the products and services themselves. In service business this value is created in an interaction between the customer and service provider, when the customer uses the service or product. According to Oh & Pizman (2008) that if service business performs sustainable water management or general environmental concerns it can give added value to the companies' service and products. To achieve successful environmental performance is, as noted by e.g. Bodhanowicz (2005), appropriate tools needed and for managing the indirect water management may water footprint be a suitable concept.

2.2 Water footprint

2.2.1 The concept of water footprint

The concept of water footprint (WF) was developed by Hoekstra in 2002 as an indicator of fresh water use. A water footprint considers the total water consumption of a producer or consumer which means that not only the direct water use but also the indirect water use is treated. It can be developed for a product, a company, a nation or an individual. For a product a water footprint indicates the total volume of freshwater used over the whole supply chain to produce the product (Hoekstra et al, 2011). There is a similar concept which is *virtual water* and this refers to the water needed to produce agriculture commodities. It gives a basis for discussion about trade of water in virtual form, that water is theoretically exported and imported in food products (Allan, 2012). A water footprint, as presented by Hoekstra et al (2011), differs from the concept of virtual water since it offers a wider perspective; it can be applied in a broader context such as a consumer, producer or service provider. In additional to the volume of water used a water footprint should also consider the location of where water is used and when as well as what source of water is utilized. In Mekonnen & Hoekstra (2010)

the division of water source in blue, green and grey water footprint is elaborated. The blue water footprint consists of the consumed water from surface and groundwater, while the green water footprint refers to the part of the consumption which is from rainwater stored in the soil. Grey water footprint show pollution measured in volume freshwater needed to assimilate the load of pollutants. The importance of dividing the water footprint in these three components will be discussed further in next section regarding water footprint and food. The facts regarding water source and vulnerability of the local systems where the actual water consumption takes place provide information for evaluating how serious the impact is. It is however highlighted by Hoekstra to note that a water footprint does not itself indicate the severity of water consumption and pollution at the local environment but rather needs other indicators such as the vulnerability of the local water systems. A water footprint assessment can help to understand what to do but does not give information on how to do (Hoekstra et al, 2011).

For this study the concept of water footprint is useful as a framework since it highlights the insofar not well treated areas of water management at hotels, the indirect water use. The use of this concept and as well to further consider the severity and impacts in water management within the tourism and hospitality sector is not a well spread activity. How the concept of water footprint can be adopted and used as an indicator in the case of this study is to be discussed in analyse in Chapter 5.

2.2.2 Food water footprint

Water consumption by food served at the hotel illustrates the complexity of hotels water use since water use in food consumption is out of control of the user and when food is imported the impacts occur elsewhere (Hoekstra, Chapagain, Aldaya & Mekonnen, 2011; Roth & Werner, 2008). In this study the concept of water footprint will mainly be discussed and applied on food consumption in hotel restaurants. In line with the principle of calculating the water footprint of a business (see Hoekstra et al, 2011) a water footprint on hotels food consumption are to be calculated by adding the water footprints of every food commodity together. The concept of water footprint of a product refers to the sum of all water consumed in every step of the production (Aldaya & Hoekstra, 2010). To measure a complete water footprint of the food served at a restaurant it is therefore a necessity to first access calculated water footprint of all ingredients in order to sum them together. A correct evaluation of a food

water footprint impacts requires complex considerations since there is a need of adopting a wider perspective of geographically and temporary specification as well as water source. An illustrating example is presented by Harris (2011) of comparing the water footprint of an M&M's peanut product and a pasta sauce product. A first assessment showed that the M&M's used five times more water. Interestingly, when the source of water and local scarcity was taken into account the impacts from M&M's footprint was actually only one tenth of the pasta sauce's footprint. Another study presented in Aldaya & Hoekstra (2010) analyse the concept of green, blue and grey water footprint of pizza and pasta products in Italy where a first step was to calculate the water footprints of the primary crops in every ingredients. Analyse of pizza Margeritha show an estimated total water footprint of 1216 litres for a 0,725 kg pizza. Of the three main ingredients that are analysed stands the mozzarella for 73% of the water use, the bread wheat flower 24% and tomato puree 3%. A deeper scan of the water footprint of one of the ingredients, the bread wheat flower and its division of green, blue and grey water footprint reveal that mostly rain water is used. The fact that the flower's green water footprint (rain water) is the main component and that the flower in this case is produced in northern Italy with low water scarcity is low implies that the water footprint of this ingredients do not seem to represent a problem.

There are some standard values for WF of food items presented in Hoekstra (2008) which does not include the actual impact on the local environment which as discussed above is dependent on local conditions and other factors. The list is however presented below.

Global average food water footprints

Food item	**Unit**	**Litres**
Beer (from barley)	1 glass of 250 ml	75
Bread (from wheat)	1 kg	1300
Cabbage	1 kg	200
Cheese	1 kg	5000
Chicken	1 kg	3900
Chocolate	1 kg	24000
Coffee	1 cup of 125 ml	140
Cucumber or pumpkin	1 kg	240
Dates	1 kg	3000
Groundnuts (in shell)	1 kg	3100
Lettuce	1 kg	130

Maize	1 kg	900
Mango	1 kg	1600
Milk	1 glass of 250 ml	250
Olives	1 kg	4400
Orange	1 kg	460
Peach or nectarine	1 kg	1200
Pork	1 kg	4800
Potato	1 kg	250
Rice	1 kg	3400
Sugar (from sugar cane)	1 kg	1500
Tea 1 cup of	250 ml	30
Tomato	1 kg	180
Wine	1 glass of 125 ml	120

Figure 1: Standard values food water footprints
Source: Hoekstra 2008

2.3 Environmental performance

2.3.1 Tools and indicators to improve performance

There is a rising awareness among hospitality organisations regarding their environmental performance. In addition to evaluate their financial performance hotels are also increasing their involvement in environmental and social issues (Bohdanowicz, 2006). As discussed in section 2.1 there is a need and also potential benefits of environmental commitment for tourism and hospitality organisations.

To improve environmental performance it is of importance to have a way of measuring the organisations environmental data for being able to assess and make decisions of further development, like as pointed out by Wöber (2002, p 7) “You cannot manage what you cannot measure”. Environmental indicators is a way of treating information on environmental data which makes monitoring, target setting, measure improvements, reporting and benchmarking possible (Jasch, 2009). One weakness of development in sustainable tourism identified by Liu (2003) is the absence of appropriate way to measure sustainability in tourism, a lack of suitable indicators. Hunter and Shaw (2007) do also see a room for improvements in finding suitable indicators for sustainable tourism. In addition of assessment and monitoring for

improvements of sustainable development in tourism, these indicators can also give a meaning of the term sustainable.

Environmental indicators can take several forms (Park & Yoon, 2011). The most common indicators for hotels are monitoring water or energy consumption but often is it only the overall consumption which is measured, and not for specific facilities or different parts. This makes it more difficult to assess and understand the consumption pattern and therefore less likely to improve the efficiency in the resource management. Water consumption could be divided on guestroom, reception and different facilities like a restaurant (Bodhanowicz, 2006). Another environmental indicator in tourism can be ecological footprint and is suggested by Hunter & Shaw (2007) to be a key indicator of sustainability in tourism for planning and as management framework. Also (Gössling, Borgström Hansson, Hörstmeier, & Saggel, 2002) identify ecological footprint as a concept to assess sustainability in tourism. Ecological footprint analysis is to estimate consumption of recourses and waste contribution in an expression of "demands upon natural resources in term s of an equivalent land area" (Hunter & Shaw, 2007, p 47). Analyses of ecological footprints in tourism are not very common and have this far mostly focused on local destinations impact as well as mostly bearing in mind recourse demand. Less attention has also been paid to a global perspective and impacts elsewhere then the local surroundings (Gössling et al, 2002; Hunter & Shaw, 2007). Like the ecological footprint the concept of water footprint is identified as a possible useful indicator (see e.g. Galli, Wiedmann, Ercin, Knoblauch, Ewing & Giljum, 2011). When developing an indicator it is important that the models and calculations are not more complex than that the user can still understand which factors influences the indicator. It is further of necessity that an indicator is consistent with well defined calculations in order for the indicator to be reliable and comparable (Jasch, 2009).

One way of applying environmental indicators is using benchmarking practices and environmental benchmarking are used by organisations to compare performance both internal as well as external (Matthews, 2003). A common failure of managers is to successfully establish operational goals and Camp (1989) suggest that the need of benchmarking can here be seen. Also Wöber (2002) present a definition of benchmarking as "a way in which to establish new, more relevant and efficient standards to performance" (Wöber, 2002, p 7). In Bodhanowicz (2006) benchmarking is identified as a management tool which is gaining popularity to assess and improve environmental performance. Wöber (2002) discuss further different types of benchmarking and which one an organization adopt depends on the focus and methodology for the area to be benchmarked. There is internal benchmarking which is the

most used form and consists of an audit to understand strength and weaknesses as well as best practices within an organisation. This part may also be a starting point for external benchmarking where performance is compared with other organisations. External benchmarking is either competitive and comparison is here made with rivals in the same industry, often performed by strategic consultants or the comparison is done with firms in other industries. The latter one is done often by a pool of sharing companies to identify best practices within a certain area. Both Bodhanowicz (2006) and Wöber (2002) identify however the need of more suitable indicators, as a food WF, to provide measures of performance as earlier noted.

2.3.2 Resistance to change

Environmental performance and development of a new indicator can be viewed as a part of an organizations ongoing change process. Since all organization is to more or less dependent on its external environment, adoption is required to external factor such as scarcity of natural resources. Therefore to achieve successful management organizations must be adoptive and learn to manage change (Mullins, 2001).

Even in cases when there is a need to adapt to the external environment there is often resistance to change in different levels within the organization which make the implementation more difficult (Mullins, 2001). Independent on the scale on the change, resistance can occur from several reasons (Burnes, 2004). At managerial level the reasons of existence resistance to change are several. Change does often demand large resources since it is challenging to change assets such as buildings, equipment and people. A need of formal structure and procedures to maintain stability can be another reason for resistance to change. This is of particular importance in large-scale organisations. An additional view against change is the fact that managers do feel a comfort in well known routines. At individual level the ‘fear’ or resistance to change is rather common and there are several factors behind the causes of this feeling. One contributing factor can be an uncertainty of the unknown as well the fact of not being comfortable in changing habits. (Mullins 2001) Another source of resistance to change among staff members can be a way for employees to attract attention from top managers and to be taken more seriously. Burnes (2004) highlight the importance of being aware of all possible factors for resistance to change in order to stress positive points and that the suggested change may not have those big impacts as feared. To fail in this is one

major mistake when companies are to introduce changes. Some part of resistance may also be good since it contribute to organisations considerations about consequences of change processes.

Mullin (2001) present a study which show similarities of resistance to change between hotel firms and manufacturing firms. The main factors to resistance is according to that study lack of resources and time, other business within the organisation is more prioritised, fear of insecurity and to lose something valuable as well as a fear to unsatisfying customers. One of the most important factors for successful change is however managerial behaviour.

In this study practical challenges of implementing a food water footprint are in some issues analysed within the concept of resistance to change and this presented in chapter 5.

2.4 Summary

The theoretical framework of the study has been presented in chapter 2. The tourism industry is dependent and a high consumer of water recourses for both direct and indirect use, even though the connection to the direct use is more distinctive. Water management as a part of a hotels environmental commitment are probably not a major marketing factor but can contribute for an improved image towards customers as well as business partners. For environmental performance are more suitable indicators required and the concept of WF can here be useful. The concept of WF was developed by Hoekstra (see e.g. Hoekstra, 2003) and includes in addition to direct water use also the indirect use. The source of the water and the local conditions should also be taken into considerations for a comprehensive impact assessment. To develop a hotel restaurants food WF the different food items on the menu would need to be added together, in line with the WF of a business presented in Hoekstra et al. (2001). For food items exists some standard values but these does not cover all victuals and does not show the total environmental impact. Developing a food WF can facilitate the measurement of a hotels environmental performance for assessing and improvements as well as possible uses for benchmarking practices. Developments and implementations of a new indicator implies a change within the organisation which might meet resistance and to identify potential barriers is therefore of necessity for a successful implementation.

3 Method

3.1 Methodology approach

Chapter 3 describes the approach and methods chosen in order to answer the research question. A qualitative exploratory study is conducted (David & Sutton, 2004) of challenges implied in developing a food water footprint at a small hotel and possible consequences. Interviews and documentary research are the two used methods and they will both be presented in detail in the separate sections 3.2 Interviews and 3.3 Documents. A hotel with restaurant facility is the base for the interviews. One interview will be held with the owner who because of the size of the business also has the role as a manager who as well in charge of the environmental performance. Another interview is conducted with the executive chef at the hotel's restaurant. The document research consists of documents that are not created especially for the aim of research but present examples of developing water footprints. To continue a section about analysis of the data will be presented in 3.4 Qualitative content analysis as well as a section about limitations and critique in 3.5 Methodology reflections.

The aim of this study is to discuss what challenges are implied in developing a food water footprint and the possibilities in using this to improve environmental performance, within the scope of the tourism and hospitality sector. Since there is almost none existing research conducted in this exact area an exploratory study is conducted and follow an inductive approach (Bryman, 2008; David & Sutton, 2004). The theoretical framework presented in chapter 2 present a body of theory regarding water footprint and environmental performance. Few literature discuss food water footprint in the context of using the indicator as a tool for environmental performance and especially not within tourism and hospitality. Existing research on water footprint is as well relatively new and modest. No hypothesis was drawn from the literature and therefore this study aim to follow the inductive approach to generate contribution to theory from empirical data and not vice versa (May, 2001). It is noted by David and Sutton (2004) that even when an inductive approach is undertaken some sort of preconceptions will always exists and also this study will contain some deductive elements. The interview questions are for instance created in consideration with the theoretical framework. As in this study, qualitative research does in most cases use theory as a background and a strict distinction cannot be made between inductive and deductive approach (Bryman, 2008). This study is however of exploratory character with a mainly inductive approach.

3.2 Interviews

3.2.1 Semi-structured interviews

In order to meet the aim of the study two interviews are held with respondents at the hotel and its restaurant. In Bryman (2008) the flexibility of interviews as a research method is highlighted as one advantage. Qualitative interviews are attractive in this study since they provide a base to find out initial research ideas and opinions from the respondent (Bryman, 2008). The purpose of the interviews in this study is to get an insight in ideas about developing a food water footprint from a hotel manager's perspective and executive chef's point of view. Information that is desired from the interviews is practical information regarding the food that is needed for measuring a food water footprint. This will contribute to the discussion of which practical challenges are implied in developing such a footprint. To gather data for answering what problem may occur with implementation of a water footprint questions about implementation of existing environmental performance are asked in order to be compared with the characteristics of water footprint in the analysis. Further on, questions are posed to find out opinions and reactions to a food water footprint in general and to use as a tool for improving environmental performance.

Semi-structured interviews are used in this study which implies that a list of question is created before the interview, as an interview guide (see 3.3.3). This guide help in structuring the interview to gather the required information but the guide have not been followed strictly. Follow-up question can be asked which are not in the interview guide and the respondent has the possibility to answer the questions in a rather free manner (Bryman, 2008; Flick 2009). This more open-ended style of asking questions is preferable when, as in this study, the researcher wish information about how and why is desired to understand a certain phenomena. Interviewer is, as highlighted in May (2001) more free to probe beyond the answers and since the researcher can 'seek both clarification and elaboration in the given answers' (May, 2001, p 123). For this study the style of semi-structured interview was suitable for the research design and question. In shaping and conducting the interviews the semi-structured interviews therefore helped in structuring of the work which will be further described in the next sections.

3.2.2 Sampling and access to the field

According to Bryman (2008) there is often a lack of transparency in research and especially in the sampling part and sampling procedure in this study is therefore to be described. The way of sampling in this study can be referred to as purposive sampling, which is used in order to find a sample which is likely to fit the research question. This sample is often of fewer numbers (May, 2001). Also Bryman (2008) discuss purposive sampling as 'to establish a good correspondence between research question and sampling' (Bryman p. 458). A criterion for a suitable sample considering the research question was created for this study. One first criterion for the sample of this study is a hotel with restaurant facilities, or a similar business within the tourism and hospitality sector since this is the sector to be researched. Restaurant facilities are necessary since it is the investigation consider water footprint for food. It is further desirable for the selection of sample is an organisation where some environmental management is performed. The latter criterion is formed in order to match desired answers to questions about how their environmental work is structured and possible experienced problems with implementations of new routines in this field. In addition, a convenience criterion (see Flick, 2009) needs to be considered. It may be difficult to find suitable respondents especially bearing time restrictions in mind. In the case of this study an earlier contact with an appropriate hotel business existed. After other less successful attempts to find other respondents this one was contacted. One of the owners of the hotel as well as the executive chef agreed on being interviewed. When acquaintance with respondent exist it is important to consider that the role as a stranger is somewhat lost, which can affect the answers (Flick, 2009). In this case the contact is very formal and not of private means and is therefore not suppose to influence the result.

3.2.3 Interview guides and setting

Due to time restrictions the interviews are held over the phone. According to Bryman (2008) it is not a very common way of conducting interviews in qualitative research but may be the case for practical reasons. Long lasting interviews are not appropriate to conduct over phone but in this study both interviews were about 30 minutes and therefore this issue should not cause a problem. Another disadvantage is however that it is not possible to observe body language and reactions to a question or certain topic. On the contrary, one benefit to perform interviews over the phone can be that respondents may be less stressed in answering questions that possibly are sensitive to the respondent (Bryman, 2008). The interview with the owner

was recorded while the one with the executive chef was not because of technical restrictions. Benefits with recording are that the researcher can focus on the questioning as well as interaction with the respondents and a word by word transcription is possible (May, 2001).

After the interviews are performed a transcription of both interviews took place to prepare the material for analysis. Transcribing is to expect to be time consuming and it is important to consider the quality of transcription in order to prevent errors (Bryman, 2008; May, 2001). In consideration of method literature the transcription of the interview with the owner of the hotel, which was recorded, was made in detail but some parts that are not relevant for the study was left out. Transcriptions are preferable made as detailed as possible and needed. When choosing level of detailed in transcribing it is important to consider what information the study is searching for in the transcripts (Flick, 2009; Silverman, 2006) In addition to what is said attention is also paid to how it is sad considering pauses and other features which is possible to observe over phone. These may be of importance to analyse people's mind (Silverman, 2006). For the interview with the chef notes were made during the interview and the transcription was conducted in detail right after to remember as much as possible.

Interview guide

An interview guide was created for each of the two interviews in order to keep the focus on the topic and to give some sort of structure (Flick, 2009). The participants should be provided with information on the purpose of the interview and what is expected of the interviewees (Flick 2009). Based on advices in Bryman (2008) the questions in the interview guides in this study are formulated to find information which can contribute in answering the research question but they should not be too specific. May (2001) suggest for semi-structured interviews to create a thematic guide which allow probing and expanding the discussed issue.

The interview guide for the interview with the owner of the hotel started with giving a short background to the study and introducing questions (Bryman, 2008), such as "Can you tell me shortly about your engagement in environmental issues?". This question is posed for contributing to information about how the environmental performance is currently shaped in the organisation. Flick (2009) highlight the necessity of having a certain understanding but at the same time keep the distance to the respondent. Based on information on the hotel's website an understanding that there is an environmental commitment in the performance of the hotel but one need to be aware of own expectations and the fact that they should not be too

well seen (Bryman, 2008). From the website of the hotel it is possible to see that the business has obtained the environmental certification *Svanen* and questions about this are to be asked.

The introducing part is followed by a cluster of questions regarding the environmental performance and if any tools are used to structure and improve the work. Questions such as "Do you have a way of structuring your environmental commitment?" with follow-up question "If yes, in what way?" are asked to find out about if any tools are used to improve the environmental performance and if so in which way. Other examples of questions in this part are "Are there any other 'tools' you use for supporting you environmental commitment?" and Do you compare you water use with other organisations?". Next theme in the interview guide is regarding the implementation of environmental practices. Here questions are posed such as "Have your environmental commitment implied any changes in daily routines?" and "If yes, have you experience the implementation challenging sometimes?". These questions are yes and no answers, if respondent do not elaborate automatically will probe questions like "Can you tell me more about this /which ones?" be posed (Bryman, 2008). Next theme is more direct related to food water footprint to find out about some practical information as well as the respondents opinion to water footprint as an indicator and possible improvement for the environmental performance. According to Bryman (2008) it is recommended to wait whit this more direct question about respondent's opinion to the end to not influence other answers. For a complete view of the interview guide see Appendix 1.

The interview guide for the executive chief at the hotel (see Appendix 2) starts similar with a short introduction to the topic and also what information are to be asked from respondent. As an introducing question the following is posed:"Have you heard about food water footprint before?". Next part of the interview guide consists of questions about practical issues for restaurant food which is required to know for developing a water footprint. Some examples of questions are "How does the procedure of buying food products look like?" and "Do you know if it is possible to access information about the water used in the production? ". Similar as with the other interview, is that since these questions are yes/no questions, follow-up questions are to be posed when needed. These questions are asked partly to get an insight about the situation but mainly find out about if chef at this hotel thinks it is possible to access such information. Only because of the respondent in this case tells that this kind of information is not accessible does not mean that is the reality. Another questions asked in this part is "Do you know if KRAV when certifying their products is considering water use?" and this one is mainly posed in order to see if the chef is somewhat informed about food and the

environmental certification they use. After this section follows a theme about opinions regarding food water footprint and its possible uses. An example of question here is "Do you think you would you find it interesting to use food wfp as an indicator of your environmental performance?" These opinion questions are expected to give insight ideas and possible resistance if a food water footprint is to be implemented. In developing both interview guides attention was paid to the language which should not be too comprehensive and no leading questions (Bryman, 2008).

3.3 Documents

Analysis of documents is made in addition to the interviews, primarily as a contribution for answering the research question of what challenges are implied in developing a food water footprint. This analysis is as well conducted to contribute in meeting the aim of the study to discuss water footprint as a tool for environmental performance. The purpose of using this method is to get a deeper understanding of difficulties in developing a water footprint and possible uses (May, 2001). These documents can be seen as an enlargement of the theoretical framework and are suppose to provide a base for discussing the result from the interviews, as documents can be used in research to get a broader picture of the research topic (Silverman, 2006).

As documents occur in a variety of forms is it of importance to determine what type of documents is to be used. In the case of this study the wanted documents are not recorded specifically in the aim of research, e.g. not trough an interview. Since these documents are not collected or written in this study they are secondary sources (Bryman, 2008; Silverman 2006). The documents in the sample have to be open-published, i.e. searchable on the internet. It is of necessity to consider which documents are available due to openness and due to time limitations in requesting the documents (May, 2001). According to the classification in Bryman (2008) the documents used in this study are official documents deriving from private sources as an organisation or company. As for the interviews, purposive sampling was used to collect appropriate documents. Different search words were used in internet searching tools. The size of the sample in this study was guided by the principle of saturation sampling and the most determining factors were the aim of the thesis and resources in time. The result of the data collection is the following four documents:

- Product Water Footprint Assessment – Practical Application in Corporate Water Stewardship, Author: The Coca-Cola Company & The Nature Conservancy
- UK Water Footprint: the impact of the UK's food and fibre consumption on global water resources, Author: WWF (World Wilde Fund for nature),
- Water Footprinting – Identifying & Addressing Water Risks in the Value Chain, Author: SABMiller & WWF (World Wilde Fund for nature)
- The Accor group's Environmental Footprint – First multi-criteria life-cycle analysis for an international hospitality group, Author: Accor

(For sources see reference list)

The four documents are different from each other. The first document regarding Coca-Cola Company's product assessment includes more detail information about calculation and the scope of the water footprint. Green, blue and grey water as well as local conditions of production are considered. Similar content is presented in WWF and SABMiller's report. Both these reports discuss WF of production companies and their own products. The other report produced by WWF about UK's footprint does not include many details about the measurements and no attention is paid to blue, green or grey water footprints. In this case the perspective is not from a producer but instead from a nation as a consumer. The last document in the list is also from a consumer perspective, as a business. This document is however different from the other since it does not in particular discuss water footprint carefully but it is mentioned and indirect water use in food are treated. In addition the Accor document is the only one found which discuss water footprint of a hotel. The different perspectives present in the collection of documents are supposed to give a deeper understanding of the topic. The authors of the documents are likely to have a certain point of view they like to express and a purpose of writing the documents (May, 2001). When analysing the content this is paid attention to since it is for instance possible that the companies of the documents in this study only want certain parts of the information to be presented.

According to May (2001) document research in itself does not specify what method is used, it depends on the way the researcher approach the document. In this study the documents are analysed by qualitative content analysis which will be presented in the next chapter.

3.4 Qualitative content analysis

The empirical material which consists of transcribed interviews with the owner and the executive chef at the hotel as well as documents are to be analysed by qualitative content analysis. It is a flexible method, which is designed be the characteristics with every unique study, for organising and treating the material for more comprehensive analysis (May, 2001).

Qualitative content analysis implies a coding of the text material into categories and themes. The procedure of this coding is not fix and need to be determined by the researcher to match the study (Bryman, 2008; Hsieh & Shannon 2005). In line with recommendations in Bryman (2008) the coding procedure started with getting familiar with the material and with having the research question in mind to generate some categories. More time was required to get familiar with the document material than for the transcriptions of the interview since this material is of less quantity and already to some extent known. During the process the categories were somewhat revised when necessary, for coding schemes for the interviews data see Appendix 3. Even though the transcribed material from the interviews is not so large it is rich of information and need to be organized and structures in order to ease the analyse. In qualitative content analysis how and what is written in the different categories are of interest in difference from the quantitative content analysis where number of times a certain mention appears is of interest. In this study the number of times one thing is mention are not relevant since it is not relevant for the research question (Silverman, 2006).

The coding procedure of the documents started with identifying a unit of analysis as recommended by Zhang and Wildemuth (2009) for determining what is to be analysed in the text and to more easily create a suitable coding scheme (see Appendix 4). In line with the research question the unit of analysis of the documents are identified as three themes:

- Methods regarding the development of a water footprint
- Impact assessments and considerations
- Implications and uses of the calculated water footprint

3.5 Methodology reflections

During the work with this study, when more knowledge was gain, an idea was created that it would have been interesting to conduct a simple calculation of comparing the studied hotels

direct water consumption and its indirect water use through the served food. This may possibly have been done by using average values from Water footprint network and others that may exist of water consumption in different food products. These average values do however not exist for all products, see list section 2.2.2 and do not relieve important information as discussed in theoretical part in chapter 2. An attempt to conduct this comparison of the hotel in this study would still have been interesting as concrete base for discussions. Due to time restrictions especially for collecting necessary information and for performing these calculations such a comparison could not be conducted in this study. It is a suggestion for further research see Chapter 6 and a discussions of this kind of more crude calculations are discussed in Chapter 5 and 6 based on the document of the Accor Group.

The respondents in the two interviews represent a small organisation which may imply other kind of difficulties of implementation than in a larger organisation and thereby the generalisation. It is for instance possible that communication and motivation is more easily spread in the business size of the hotel in this study. This may affect the external validity since the conclusion is less likely to be translated into larger organisations (Bryman, 2008). Other issues are on the other hand possible to exist independent of the type of organisation. However, it is of importance to be aware of this when discussing the conclusion of the study.
Further on, regarding the interviews is the fact that the sample is small and a rather unique case worth discussing. Two interviews at one hotel do only give one view and what this study show may have a completely different result in another hotel. Confirming theories is however not the aim since this study is exploratory.

Regarding the interview guide the questions were constructed with time limit and better preparations might have implied better questions. The data from the interviews for discussing possible consequences of implementing a food WF is partly based on questions regarding their existing environmental commitment. There are possible differences that might affect the result since existing environmental indicators often means direct measurements, but a food water footprint consist of indirect use.

The author of a document has an impact of what is written and for the documents in this study are most conducted by companies, which might cause that they chose to not relieve all information. This potentially missing information is however not likely to influence the result of this study in too big extent. The aim of analysing the documents is mostly for discussing possible ways of developing and using a WF but not for instance exact comparison of products.

3.6 Summary method

Chapter 3 contains a presentation of the chosen methodology for answering the research question. This study has an exploratory approach and semi-structured interviews and document analysis has been chosen as methods. The interviews are conducted with the owner and the executive chef at Slussens Pensionat, a small hotel with restaurant facilities. In order to broader the perspective has four documents containing information about developing water footprints been analysed. Qualitative content analysis has been working as a support for the analysis of the data and the empirical findings are to be presented in the following chapter.

4 Empirical findings

Chapter 4 contains a presentation of the data collection trough the two interviews and as well from the four documents. First will the data from the interviews be described and then followed by presenting the documents. The structure of the data presentation is helped by the qualitative content analysis which also is the base for analysis in next chapter. For the coding scheme of the qualitative content analysis and examples of each category see Appendix 3 for the interviews and for the documents in Appendix 4. In the appendices for the interviews is also the Swedish original version of the example quotes presented.

The data from the interviews will be used together with information from the documents as a basis for analysing and discussion in chapter 5 of challenges in developing a food water footprint and the possible consequences for the organisation.

4.1 The hotel case

4.1.1 Slussens Pensionat

Slussens Pensionat is a relatively small business that consists of a hotel with 30 rooms and a restaurant which has a capacity of 150 dining guests. It is situated in natural surroundings by the sea at the island of Orust, approximately 80 km by car or bus from Göteborg. The hotel consists of five houses and is carrying an image of "the Swedish music hotel", since during summer there is a concert every night with famous Swedish artists performing their music for the restaurant guests. Slussens Pensionat presents themselves as a legendary music club in summertime and a quiet and relaxed conference hotel in autumn and spring. Sustainability is part of the business strategy at Slussen for both the hotel and restaurant part, and they have achieved the Nordic Ecolabel Svanen. Their environmental commitment is also well market at the homepage (Slussens Pensionat homepage, 2012).

4.1.2 Environmental performance

The environmental commitment at Slussen dates back several years, the hotel owner explain that "There has always been a personal interest, with awareness about the environment and so… then when starting to run a hotel and restaurant this way of thinking has been included in the business as well". The owner tells that in the beginning this environmental commitment was not well structured but when they started to work with the environmental certification

“Svanen” they became more organised. She explained further that “we became more conscious when buying new stuff and so on...and we simply became more consistent in our work” and that the criteria of Svanen worked as an indicator of their performance. For their routines for food commodities the chef explains how he is guided in his work and says that “the policy of Slussen is to buy as much ecological and local products as possible”. When questions were asked about measurement of for instance regarding their water consumption and if they use to compare (benchmark) their numbers against other similar business the owner answer they do not compare with others. She mentions that it would be rather difficult since “the problem is often that we also have the restaurant and it has been difficult to separate…eh the water…so before we got very high water consumption per hotel guest”. Now they have however invested in new water meters, which makes it possible to measure separately for all their different units and also per month or per year. The owner is satisfied with this and explains “now I will have much better basic data for the statistics and for next certification round”.

4.1.3 Implementation and practical issues

Slussen’s environmental commitment does cause changes in their everyday work such as in the routines for cleaning and recycling as well as in their communication with the customers. To achieve a more sustainable business it is also of necessity to encourage the guest to more environmental friendly behaviour. When being asked about difficulties with implementation the owner think about the staff and answer that “Difficulties? No, it's the opposite..! ..This is something that is engaging the staff”. She explains how they seem to be proud of the hotels environmental certification and how they often come up with suggestions for improving the work. In summer, during the high season is about 15 people hired fulltime and five persons part time. In the low season are only two employees working full time except for the two owners and about six people are employed by hours. Some difficulties however were mention by the owner. One issue is regarding cleaning products that was removed which was not appreciated first but the owner notes: “but they still understand why...and yes, it's mostly a question of breaking habits I think”. Now after some time, when they do not have this products anymore there is not a problem. Another issue regards the chefs and saving water in the kitchen, which sometimes is challenging. The owner clarify that it happens that the chefs let the water from the taps run since it is easier for them. “But definitely not of resistance or so...it’s more just that it's a bit hard for them... to think about it”.

4.1.4 Food water footprint

Available information

Indirect water use is not considered in the environmental engagement at Slussen today. When starting to talk about food water footprint with the chef he announced that he never heard about the discussion of indirect water consumption in food production before. “No... I've not heard about that actually...it's completely new to me.” Discussions were held with both the owner as well as the chef about available information related to food water footprint. Regarding information about water consumption for the different food commodities the chef can confirm that there is no such information from the suppliers, at least not as he knows about. Since local conditions are important for assessing the impact of a water footprint the availability of such information is discussed. The opinion of the owner is that this information is available and relatively easy accessible from the suppliers since they have to be able to present this. She mentions however that “then I don’t know if you can find out exactly where within a country...I mean, there are great regional differences”. She points out that this is only her opinion and how available the information is does probably the chef now better. The chef’s answer is similar, he says also that this information is not too difficult to get from the suppliers but he does not know how precisely the origin of the crops and livestock can be found out. The chances of getting hold of existing information is however good at Slussen, “especially at Slussen is it easy since we have close contact with the suppliers here”. To continue the chef think that information about used water source in the production is probably hard to get, “my guess is that probably that’s very hard to find out...but I have actually no clue.” He also mentions that he do not think that existing ecological food labels like Krav consider water consumption. To find out about water source for the products does not seem reasonable neither to the owner.

Difficulties and utilization

Both the owner and the chef do however find the concept of food water footprint interesting. Especially the owner seemed curious about the topic and when being asked about if water footprint sounds interesting she answered “I definitely think so...I mean, I'm interested in all these kinds of questions”. The respondents do both mention that it also depends on how the water footprint would be conducted and how it could be used. “Well it takes…eh…that someone else do the calculations” is stated by the owner when she explains how she see possible uses if someone else would provide more compiled information connected to the

products they buy. She mentions certification, which also the chef do but he remark that “but not as a new certification...that would feel unnecessary, but if it can be included in an already existing certification, like Krav for instance, that would be good”. If more information about water consumption of victuals such as a water footprint would be available the owner highlights how she does not like too complicated implications of the information. If water footprint should be used as an indicator she notes that it should measurable and how “it shouldn't be too complicated. It must be simple.” An underlying fear of that this information would imply complicated restrictions can be guessed in “well it cannot be too complicated...so you again end up with those rutabagas”. The mentioning of the rutabagas refer to an earlier discussion of the interview when the owner joked about only serving these kind of root vegetables to fully meet all kind of sustainability aspects. She stills end the discussion of food water footprint with “but it is interesting…it is”.

4.2 Cases of water footprinting

The four documents present four different cases where the concept of water footprint has been used in real situations. All data presented in this section 4.2 are collected from the following four documents:

- Product Water Footprint Assessment – Practical Application in Corporate Water Stewardship, Author: The Coca-Cola Company & The Nature Conservancy
- UK Water Footprint: the impact of the UK’s food and fibre consumption on global water resources, Author: WWF (World Wilde Fund for nature),
- Water Footprinting – Identifying & Addressing Water Risks in the Value Chain, Author: SABMiller & WWF (World Wilde Fund for nature)
- The Accor group’s Environmental Footprint – First multi-criteria life-cycle analysis for an international hospitality group, Author: Accor

4.2.1 Scope and objectives

The studied case of the Coca-Cola Company consists of a collaboration between the company and The Nature conservancy as well as with other researchers and consultants who conducted the study. A product water footprint assessment is made of their product the 0,5 litre Coca-

Cola pet-bottle. The aim of this assessment is to use it as "a tool to measure and understand water use throughout the supply chain" and "in order to address growing challenges related to fresh water". Another kind of water footprint is calculated by the consulting and auditing firm PwC for the Accor Group. The study contained a joint environmental footprint of Accor's hotels where water footprint was included. Here the objective was to "understand the environmental issues behind what it does and thereby build the best possible strategy to curb its impact as well as to share knowledge on Earth Guest Research platform". Similar as the Coca-Cola case SABMiller and WWF in collaboration conduct a product water footprint of a SABMiller beer product. To use the water footprint for decision making for more sustainable water management is one of the reasons of performing these calculations. The water footprint of UK as a nation by WWF has the objective of "measuring or WF and identifying where it has the most harmful impact" in order to "reducing our harmful WF where it matters most".

Similar for all the cases is the necessity of defining the scope of the water footprint which implies what to include and what to exclude in the calculations. In SABMiller's case the scope was their beer brewed in South Africa and to "start with cultivation of the crop and follow whole process to bottle recycling". What was mentioned as excluded were consumer use for washing the bottles and water use in building the machines which are used in the production. For the Coca-Cola bottle the indirect water use in the supply chain such as bottle packing and the ingredients was included as well as the direct operational use. The scope of the Accor Group's water footprint is not clear defined but it is obvious that both direct and indirect water use trough food and energy is included.

4.2.2 Methods

When discussing used methods all cases except the one of Accor Group refers to the methodology of the Water Footprint Network (Hoekstra et al, 2011). "Estimating WF on industrial products is complex but we have made a crude assessment and using best available methods" is the approached described in the case of UK. For SABMiller's beer, data sets were collected from every stage of the value chain both from SABMiller themselves and their business partners. There were some gaps of data and instead literature was used for filling them in by using some standard techniques. The Accor Group report refers to life-cycle analysis methods with a way of thinking to consider recourses used from the point where the

raw materials are extracted until end of the products life. They discuss as well the carbon footprint method but not in relation to water use.

Regarding the time frame for developing the water footprints in the cases it is not clearly stated how much time was required. In the case of Coca-Cola three pilot studies were conducted in a time period from 2008 to 2010 but the 0,5 litre pet bottle was only one of them. The issue regarding time mentioned in the report from Accor is that one year of groundwork with consultants but this is also not concerning only the water footprint but the whole ecological footprint. This gives however a hint that much time is likely to be required for developing a comprehensive water footprint.

Further what are not evident in the reports are the procedures for achieving the results and finding the data, like if standard values where used and if so to what extent. In the Accor report a list of standard values of water use in litres for food production per kg of different products presented e.g. 15 500 litres for 1 kg beef or 1 800 litres for 1 kg soybeans. The given source of this list is "Water Footprint" which mostly refers to the Water Footprint Network (see section Food Water Footprint 2.2.2). It is not clear stated how PwC and Accor found their result and if they based it on this list. If they did use this standard values, another question is how they proceed for the products which do not have a standard value while for instance the list in the report does only contain nine products. Neither in the case of UK's water footprint the data procedures are clear but what is said is however "analyse of water requirements was based on trade data from PC-TAC", which indicate that some sort of standard values were used. In the document of Coca-Cola the second pilot study concerned the sugar beets and for determining grey water footprint assumption was made for some parts. "It was assumed that 10% of the applied nitrogen fertilizer leaches to groundwater".

4.2.3 Water footprints

The water footprint for producing a 0,5 litres Coca-Cola bottle consists of about 35 litres used water of which 15 litres is green water, blue water is 8 litres and 12 litres is grey water. When analysing the production they found out that the operational WF is mostly blue water blue water but this part stands only for 0,4 litres of the whole WF. The supply chain stands for 7 litres mostly grey water while the greatest part of the WF (28 litres) is used for producing the ingredients. Among them is the sugar beet production the main part and also what the blue and green water footprint of the Coca-Cola product mostly is associated with. For 1 litre of

beer from SABMiller is the WF instead 155 litres of which the local cultivation of crops stands for 84%. Green water is the largest component and grey water has been left out because of uncertainties.

The water consumption of Accor Group is 544 million m^3 per year which is similar to water consumption of 438 000 Europeans. Of the total water footprint is 86 % associated with food and beverage. In this report there is no distinction of water source in green, blue and grey water. The Total WF of UK as a nation is 102 billion m^3 per year which implies a use of 4,645 per person per day. Agricultural products are together 73% of the total WF. They present as well a division of internal WF where livestock and cereals stand for the greatest part, as well as an external WF where cotton and livestock are large components.

4.2.4 Impact assessments

The impacts on the local ecosystems of the water footprints can only be understood by further assessments. In the report of Accor Group this is not mentioned except when discussing the direct water consumption at the hotels. Even if this part of the WF is relatively small (11%) compared to the indirect use it will be considered as important "especially in areas under water stress". What further is mention is also that water consumption is only one issue since "Accor can impact water recourses trough fertilising and crop-protection products." This shows an awareness of grey water issues but is not calculated. For Coca-Cola an assessment was conducted focusing on the largest component of the WF, the sugar beet production. It showed that the crops from the production in Netherlands are mainly rain-fed (green water) and they are grown in a region of relative water abundance. In the light of this the report concludes that the green and blue water footprint do not have significant impacts. The grey WF can on the other side have negative impacts trough high rates nutrients for the crops which can lead to eutrophication which is already an existing concern in the Netherlands.

In the report of UK a similar approach was used. The most important crops, i.e. the ones that made up the greatest part of the WF where investigated in additional case studies. To determinate these products four categories were created based on the two factors: volume of product consumed in the UK and water stressed area or not. The products in the category of water stressed area and high consumption volume were assessed in the case studies were local conditions also are supposed to be taken under considerations. The assessments of impacts of the WF in the case of SABMiller's beer product highlighted the difference within a country

and the importance of local conditions. The country of the crop cultivation is South Africa and some region are supposed to remain water abundant or sufficient but many other regions are expected to be extremely water scared by 2025. Often are impacts of a WF are less significant if more green water is used instead of irrigated (blue) water. This assessment showed that one region that was using more irrigated water had sufficient water recourses and therefore the WF here had no determined impact. In another region where the crops were mainly rain-fed the WF are likely to have negative impacts in a long time perspective since the region is expected to suffer from climate change and population pressure.

4.2.5 Implications and uses

The four reports are of different kinds and have different scopes but one key learning they all highlight is gained knowledge about where most water is used. UK became aware of the importance of food consumption for the nations WF and also the necessity of also assessing the impacts of the WF and not only to look at the WF itself. SABMiller comment in their report that "most important was to understand where in the process water is used and what pressure that may put on local water recourses". Also highlighted was the learning how huge difference of water supplies it can be even within the same region. A key learning identified in the Accor report is that most of the hotel group's water consumption consists of food purchases which imply impacts which are not normally associated with hotel operations. This learning created awareness about how changes in what kind of food is served can have environmental advantages, they noted how for instance fruit and vegetables generally requires less water than livestock products.

The results and learning of the WF assessment in the case of Coca-Cola will be used for continue to improve water efficiency. In order to do so based on the leanings from the assessment it is necessary to look at the components of water footprints separately for fully understand their supply chains. This will function as a base in decision for improving their sustainable water management. In the report of SABMiller which also is a product assessment the WF is used in a similar way, to understand where in their supply chain the water is used. Their WF was also used for developing a matrix of each business which helps SABMiller in their sustainable performance and is also to be compared between their different breweries and regions.

The uses of the WF in the UK report is to provide information for an understanding of water use, which provides a base for discussion and guidelines for what the government respectively business as well as consumers can do to reduce their WF. In the study of the Accor Group the WF was a part the ecological footprint and this "mapped out the main areas where Accor has an impact on the planet". A whole new understanding was provided, which will be used in improving Accor's environmental strategy and for supporting decisions for developing a new action plan for continue Accor's sustainable commitment. Some concrete examples are to promote more balanced menus in the restaurants and to put pressure on their supply chains. A comparison between the different hotel chains in the Accor Group is presented in the report but it does not reveal if comparisons are to be made between the hotels as well

4.3 Summary empirical findings

The environmental performance appears to be successful at Slussens Pensionat. There is a positive attitude about it and the owner does not experience much resistance in the staff when their environmental commitment implies changes. The criteria of the eco label Svanen works as an indicator of their performance but the owner find it difficult to compare their measured resource use with other hotels. When it comes to food WF the interviews showed that this is a new concept for both the owner and the executive chef. They both find it interesting if it is not too complicated. Regarding available information both respondents think it would be difficult to get information about water use in the production from the suppliers and the same for water source. Where the production is located is more likely to being able to find out, but the respondents are not sure how precise information one can get. For neither the executive chef nor the owner does food WF seem to be something they can calculate themselves.

The four documents provided different types of water footprints, for products and one for a whole hotel group while the other one for a nation. Regarding the calculations of the WF's they all where all developed in assistance by consultancy. Some standard values appear to have been used in some cases but this is not totally clear in the documents. Impact assessments were conducted by taking the local conditions into considerations for most of the cases which also affected the implications of the WF's. A general use of the WF's was that it helped to create awareness and understanding of the water consumptions. The Accor hospitality group did learn that food and beverage stands 86 % of their total water

consumption. Other uses presented in the documents were that WF served as a base for decision and policy making as well for comparison between different productions sites within a company.

5 Development of food water footprint and its consequences

This chapter contains the analysis of the findings from the interviews and the documents. The first section discusses the challenges in developing a food WF while the next part focuses on consequences of its implementations.

5.1 Development

At Slussens Pensionat is the environmental commitment a part of their image and identity. According to (Bodhanowicz, 2006 & Oh & Pizam, 2008) a business image can be improved by environmental engagement, which beside an interest of the owners at Slussen, also is one motivational factor for continuing their work. Environmental commitment requires ongoing changes to respond to the demands of a certification system and new issues in the society. The indirect water consumption is a new issue for hospitality organisations but of distinctive relevance confirmed for instance by the Accor Groups' report where it is showed that the indirect water use in their food services stands for 86 % of the hotels group total water footprint. Hoekstra et al (2011) does also mention that a company's indirect water consumption often is larger than the direct use of water. To develop a food water footprint at Slussen to compare with their direct consumption could raise a new awareness, as in the case of Accor, to improve their environmental performance. This will be more discussed in section 5.2.

5.1.1 Challenges

If a food water footprint is to be developed at Slussen is information of water consumption for every victual included in their served food required, then this information needs to be added together dependent on how big quantities of each product is consumed during for instance a year. As presented in Hoekstra et al (2011) regarding water footprint for a business, this would show the food water footprint of Slussen. From the interviews it is stated that according to the respondents knowledge is information of water use for producing the specific victual not available from the suppliers. The analyses of the documents show two cases where water footprint of a product is calculated, one of a Coca-Cola drink and sugar beets while the other for a beer. It is not clear in these reports if the results are to be shared with customers or more for being used internal. Water footprint investigations are further not conducted for

every existing victuals and there is none organised data base for this information. Both the owner and the executive chef of the hotel mention in the interviews that they do not see it as a possibility to perform any complicated calculations by themselves. This is confirmed in the documents since the WF calculations which are presented are conducted by consultant experts in the field. Regardless chosen method or if the WF concerns a product are business consuming the products does the development of the WF also appears to be time consuming.

A possibility in a case such as Slussen may be to use standard values for their products and add together as mentioned above. In the Accor report standard values from water footprint network like Hoekstra et al (2011) are referred to when discussing their food water footprint. The report does however not reveal how this standard values were used and how values for all products with no existing average value were developed. More average values than the ones presented in section 2.2.2 exists, like in another report from the Water footprint network presenting WF of soya products (Ecrin, Aldaya and Hoekstra, 2011). Within the scope of this study there is however no place found where these standard values for victuals are gathered together and no conclusions can be drawn for how many food products a standard value exist. This implies that if a food WF is to be developed at Slussens Pensionat a comprehensive research to find these values need to be conducted and it is hard to say if it would be possible to find sufficient amount of standard values. Even if standard values are used, several challenges in developing a food WF as in the case of Slussen can therefore be expected such as the time required to find these values as well as how to deal with victuals with no existing values.

5.1.2 Impact assessments

If the possibility exists to find standard values of water consumption for a sufficient part of the purchased food commodities another issue is the relevance of these values. Analyse of the documents showed that some crops and products differ a lot in water consumption from different production and cultivation. An uncertainty is therefore associated with standard values of water use for victuals.

Bearing in mind that a water footprint by itself does not reveal the impact from the water consumption on the local ecosystems (Hoekstra et al, 2011) a further question refers to how a hospitality organisation can approach these issues. Since a reason for calculating water footprint is to improve the environmental performance the environmental impacts of the water

consumption is of importance. At the same time this is most likely not possible for hotels to conduct themselves, in all the cases in the analysed documents experts from universities and consultant firms were involved to find out components of the WF like blue, green or grey water (Mekonnen & Hoekstra, 2010). As presented in most of the cases in the documents this information does also need to be assessed in relation with local condition and vulnerability which as well is noted by Hoekstra et al (2011). If no impact assessments are conducted a WF can however still be useful to cast light on the relevance of indirect water use in food in hospitality and tourism business, like in the documents containing the Accor Group's report. It is tough hard to say which part of the food consumption matters the most since it is not always what has the greatest WF that has the worst local impacts (see e.g. Harris, 2011). In some regions for some food productions there is not of great necessity to reflect about how much water is used because there is relative water abundance in the region.

An easier way of assessing impacts of water footprint for business like a hotel could be to find out the geographical location of the production and consider the water situation in the area. Similar to the UK report this could be done focusing on the food products which are consumed in great quantity and therefore are likely to have a greater impact if they are produced in a water stressed area. Such information about products origin is according to the respondents in the interviews available at least for which country the production has taken place, but how precisely is unclear. Even if an assessment like this is to be conducted it is likely to be time consuming as well and also rather difficult for a hotel to perform and as mentioned in the interviews it is not desirable to conduct complicated calculations by themselves.

5.2 Consequences

In addition to questions regarding challenges in developing a food water footprint there are also questions concerning consequences and possible uses for a hospitality organisation of a food water footprint. This part is therefore discussing implementation and different utilizations of a food WF.

5.2.1 Increasing awareness

Environmental commitment is discussed as one way for companies within the tourism and hospitality industry to improve their image and get respect from customers as well as business

partners (see e.g. Bodhanowicz, ; Oh & Pizam, 2008). In the interviews with the owner of Slussens Pensionat it is obvious, from the way of discussing the subject, that their engagement in environmental issues is a part of the hotels image. In order to engage in environmental issues an organisation need to be aware of what different impacts their business' activities have on nature resources. This awareness can be achieved by monitoring the impacts by using environmental indicators (Park & Yoon, 2011), like a food WF can be a part of an indicator of a hospitality company's water use.

First, it is possible that many organisations within tourism and hospitality are not aware at all that they have an indirect water use and neither its significance. In the case of Slussens Pensionat the executive chef mentioned for instance that "No... I've not heard about that actually...it's completely new to me" and also the owner was not well familiar with the topic. In the report of Accor Group this was also a new awareness and the fact that the indirect water use in food and beverage stand for 86 % of the total water use was presented as a key learning. Similar in the cases of water footprinting for Coca-Cola and SABMiller the fact of developing a WF of their products created knowledge about where most water was used within the production. In the aim of a hospitality organisation to create more awareness even a food WF of more simple means can possible be useful to some extent, even if not all necessary information is revealed. One learning to be achieved for a hospitality company is that certain food items on their menus implies higher water consumption. By reducing the volume of this high consumptive items and increasing the part of victuals consuming less water could give lower water consumption. To be successful it is, as discussed by e.g. Wöber (2002) and Jasch (2009), important being able to measure if changes have any effect. A food WF can serve as a measurement to compare if the WF became lower by changing food items and the proportions of them on the menu, as environmental indicators can make comparison of improvements possible (Jasch, 2009). As noted by Hoekstra et al (2011) can a water footprint assessment help to understand what to do but does not give information on how to do (Hoekstra et al, 2011).

5.2.2 Comparison for improved performance

The concept of sustainable development can sometimes appear as rather vague, both for customers and for employees inside the organisations. That is one argument why measuring and environmental indicators, as briefly discussed in previous section, are useful; to give a meaning of the term sustainability (Hunter & Shaw, 2007). At Slussens Pensionat the work

with sustainable development is identified trough measurements of water and energy use as well as certain policies when purchasing products. As mentioned earlier both by the owner at Slussen and in the literature measurements of the environmental performance are important. Further on it is necessary to establish relevant goals for improvements but Camp (1987) identify that failures are common among managers by setting targets and it is argued that benchmarking helps to set relevant goals.

Difficulties in comparing products can be seen when for instance discussing the two of the analysed reports, one from Coca-Cola and one from SABMiller. According to these reports one litre of Coca-Cola requires 70 litres of water to produce while one litre of beer requires 155 litres of water. According to these numbers, to have a Coca-Cola gives a lower WF than having the beer of SABMiller but it is difficult to know how differences in the calculations processes may affect the result.

To develop a food WF provides an opportunity to compare the indirect water use trough food consumption but there are limitations in the variety of different methods for measuring and the lack of transparency in the process. Jash (2009) discuss that if comparing should be possible it is of importance that calculations are well defined which is not always the case. External benchmarking is beneficial but in general challenging (see e.g Wöber 2002) due to the varieties of facilities. From the interviews at Slussen it appears difficult to compare with other hotels and neither not something of great interest. The possibility to compare internally is however something that seems more interesting and also more feasible. For Slussen the owner finds it useful to compare in a time perspective, as between different months and years, and trough different facilities. New meters make this possible at Slussen which satisfied the owner. The importance of measuring different facilities separately for improving the efficiency in the resource management is also identified by Bodhanowicz (2006). This can be seen as an argument why it is necessary to separate the indirect water use through food from e.g. trough energy consumption.

From the report of SABMiller it shows how their calculated WF's are used for comparison between the different production sites. For hotel chains or hotel groups like Accor a comparison between the different hotels could be useful and possible if standards for calculations are given and followed. As measuring of water and energy often are given per guest night (see e.g Bodhanowicz, 2006) does also food WF need to be divided per restaurant guest or similar for being able to compare within a hotel chain.

5.2.3 Issues of implementation

Which consequences a food WF can have for an organisation depends partly on how it is used as discussed above but as well on how successfully it is implemented. Both the development of a food WF and using it as a tool for environmental performance may imply a change in routines, structures and policies of the organisation. As discussed by Mullins (2001) is often the case that changes meet resistance within a hospitality organisation and to identify the potential reasons for the resistance is a key process for successful performance.

The environmental commitment at Slussens Pensionat has implied changes in their daily work but these changes have not met much resistance, according to the owner. Managerial behaviour is identified by Mullins (2001) as one of the most important factors for successful implementations. From the interview with the owner at Slussen it is possible to understand from the way she talks about the sustainability issues that this is something she find interesting and as a positive challenge. It is explained during the interview how the owner always had an interest in sustainable development as a private person and when talking about their certification and new water meters an attitude of pride can be identified. This positive attitude of the owner is likely to be translated into her role as a manager and then spread out on the rest of the staff.

Reasons for resistance for change mentioned by Mullins (2001) at managerial level are based on a comfort in existing routines and structure, which not appears to be the feelings at Slussen when discussing their environmental commitment. When it comes to the discussion of a food WF however the owner seems curious but as well a bit reserved when she is several times stating that it should not be too complicated. Also the executive chef appeared to be rather sceptic. He has not heard about food WF before and therefore could not imagine what it would imply. To feel insecure about something new is also one major factor of causing employees unwilling to change (Mullins, 2001). Since food WF is a rather new concept the uncertainty what developing and implementing it might be a factor that can cause difficulties.

6 Conclusions

6.1 Concluding discussion

The aim of the study was to discuss which challenges are implied in the development of a food water footprint as a tool to improve environmental performance. To meet the aim the following questions were asked: “What are the challenges in developing a food water footprint for a hospitality organisation?” and “What are the possible consequences for a hospitality organisation of developing a food water footprint?”.

The analysis of the interviews and the documents in line with the literature has shown that for a hotel or restaurant to calculate a food WF themselves in a comprehensive way also including impacts assessment appears according to this study to be too complex. The knowledge and needed information that exists is not enough. Assistance from an auditing firm like in the Accor report is likely to be of necessity, but for a smaller hospitality organisation like Slussens Pensionat hiring this assistance may not be reasonable. Hospitality and tourism organisations can also put pressure on their suppliers to provide them the information about products WF and then add the information together for determining the organisations total WF. This since the information connected to the victuals is more likely something the producer should consider as in the reports by Coca-Cola and SABMiller. Another way of for hospitality organisations like Slussen to develop their food WF is calculating a WF of more simple means by using standard values, for instance provided by the Water Footprint Network. A first question that arises is however to what extent these values exist and thereby how many different products can be covered by them. In the scope of this study no comprehensive list of standard values were found. It is however possible that a more extensive study would find a different result. A second question concerns how relevant this more simple WF would be if one manage to develop one from standard values. The reports analysed in this study strengthen what also is said in previous research that the impact of the water used for food production depends largely on local vulnerability and the used water sources. It is possible to conclude that there are several challenges in developing a food WF for a hospitality organisation today. The report by Accor shows however that is has been done and for the question how relevant a simpler WF is it may partly be answered by what is the purpose of developing the WF, how it is aimed for being used.

This study has further explored the consequences for a hospitality organisation of developing and implementing a food WF which includes possible uses. One consequence of

implementing a food WF can be an increased awareness regarding indirect water use trough food consumption. In the Accor report it is clear how they became aware of that indirect water use in food consumption is an essential part of their total water consumption. At Slussens Pensionat could developing a food WF probably has a similar effect since the data analysis show that today this issue is unknown at the hotel. From this hotels can learn which food products requires most water for producing them and if attention is paid to where the production was located, hotels can avoid high-consumptive products from dry areas in an attempt to lower their food WF. A question remains however if left out information in a simpler food WF provides misleading fact which may imply that actions for improving are irrelevant.

The study has further discussed if food WF can be used for benchmarking to improve the organisations water management. In order to compare it is of importance that calculations have been performed in the same way and a transparency in this process. These requirements appears to be hard to meet when analysing the documents since the different documents all presented different ways of developing a WF. Also in the data from the interviews with Slussen difficulties with comparison of the direct water use was identified. External benchmarking as presented in Wöber (2002) appears therefore being difficult at current conditions, but within a hotel chain comparison between different hotels might be a possibility. Regarding implementation of a WF challenges might appear in the uncertainty of what the concept of WF would imply. In both the Accor report and in the interviews from Slussen it was clear that food WF is something unknown. From analyse of the interviews a slight fear that developing o food WF would imply complicated tasks could be identified. What was also noted from the interviews in line Mullins (2001) is that good managerial behaviour helps in conquer the resistance to change.

Referring back to the aim and the research question of what challenges there are to develop a food WF is, in addition to the technical difficulties, one significant question the relevance for a hotel to engage in a commitment of WF. The connection and potential motivation of responsible management for recourses at the destinations is to some extent lost since the indirect water use trough food consumption is often not connected the local environment. For a hotels image towards customers and business partners commitment in environmental issues is however something that can contribute to improvements. The indirect water use trough food consumption stands for a significant part of hotels water use, showed in literature and for instance the Accor report. Hotels having restaurant facilities is increasing due to All-inclusive trend and water as a recourse is expected to be an issue of even more

importance in the future. The indirect water use in food consumption ought to be a part of a hotels environmental commitment for a more comprehensive environmental performance.

6.2 Further research

From the conclusions areas suggested for further research can be identified. In order to further explore if a food WF is an appropriate tool for managing a hotels indirect water consumption trough their food more detailed investigations of possible ways of developing a food WF is needed. Preferable one or several cases can be chosen for a study where development of a food WF can tried to be performed as well as possible measures to use. This could be a concrete base for discussion and verify of to what extent this could serve as an indicator for a tourism or hospitality organisation. The limitations in the developing of the WF as well as the relevance if information is missing could be identified.

Also further studies regarding motivational factors and potential benefits for organisations in tourism and hospitality industry to engage in management of their indirect water consumption can be beneficial.

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Interviews

Vibeke Sohlberg, Owner, Slussens Pensionat

Executive chef, Slussens Pensionat

Appendices

Appendix 1 – Interview guide hotel owner

(Translation from the original one in Swedish)

Short explanation about the study before starting:

Trough the food we are eating we leave a water footprint somewhere else, which may have negative environmental impact. For hotel and restaurant business are measurements today often concerning only the direct water use. My study is discussing a development of a food water footprint as an indicator indirect water use in food in the hotel and tourism sector.

Questions

Can you tell me shortly about your environmental work?

Environmental performance and water use

Do you have a way of structuring your environmental commitment?

If yes, in what way?

Does Svanen (Nordic ecolabel) influence your environmental commitment?

If yes, in what way?

Are there any other 'tools' you use for supporting you environmental commitment?

(Do you keep record of your water consumption?)

Do you compare you water use with other organisations?

Do you compare your water use with the levels in the Svanen criterion?

(I will now continue to questions about implementation of your environmental engagement)

Implementation

Have your environmental engagement implied any changes in daily routines?

If yes, have you experience the implementation challenging sometimes?

If yes, in which ways? For which kind of changes?

Have you experienced implementation of new routines to be successfully?

If yes, what do you think affect this?

Food water footprint

For the food part, how much do you (the owner) influence and how much is up to the chef?

How does the general picture look regarding your food import?

According to you, would you think it is possible to find out water use for the products?

According to you, is it easy to access information where the food has been produced?

Have you heard about water footprint before?

What is your spontaneous reaction to the concept of water footprint? (Fill in with information if necessary)

Do you think you would you find it interesting to use as an indicator of your environmental performance?

Thank you very much!

Appendix 2 – Interview guide executive chef

(Translation from the original one in Swedish)

Short explanation about the study before starting:

Trough the food we are eating we leave a water footprint somewhere else, which may have negative environmental impact. For hotel and restaurant business we measure today only the direct water use. My study is discussing a development of a food water footprint as an indicator indirect water use in food in the hotel and tourism sector.

I will ask some questions about practical issues for restaurant food. This will be used for discussing challenges in developing a food water footprint.

Questions

Have you heard before about indirect water use in our food?

Practical issues

How does the procedure of buying food products look like?

Do you know if it is possible to access information about where the products are produced?

If yes, how exact

Do you know possible to access information about the water used in the production?

(The same about information regarding source of water used in the production?)

Do you know if KRAV when certifying their products is considering water use?

Using water footprint

What is your spontaneous reaction to the concept of water footprint? (Fill in with information if necessary)

Do you think you would you find it interesting to use as an indicator of your environmental performance?

Can you tell me about your experience as a chef?

Thank you very much!

Appendix 3 - Coding scheme interviews

Coding scheme for Qualitative Content Analysis of Interview Excutive chef		
General		
Previous knowledge	Ex: (Regarding WF) No... I've not heard about that actually...it's completely new to me.	Ex: (Om WF): Nej.. det har jag fakitkst inte hört talas om.. det är helt nytt för mig.
Practical issues		
Routines food purchase	Ex: You know, the policy of Slussen is to buy as much ecological products and as much local products as as possible.. Which means a lot is bought from the region...then we also have our food suppliers like Wibo for fruit and so on..and Servera	Ex: Slussens policy är ju att köpa så mycket ekologiskt och så mycket när prodicerat det går.. Så en hel del köps in från regional..sen så har vi också våra grossister som Wibo för frukt o så.. och Servera.
Info water consumption poducts	Ex: Hm...I dont know that, I actually never thought about it..(paus) but that's probably more difficult... I don't think so..	Ex: Hm... det vet jag inte, det har jag faktiskt aldrig tänkt på..(paus) men det är antagligen svårare..tror inte det...
Info location	Ex: Yes..it's not very difficult to find out where the commodities have been produced...dont know really how exact info you can find out...but at least if you are looking for land and province...Especially at Slussen is it easy since we have close contact with the suppliers	Ex: Ja.. det är inte jättesvårt att får reda på var varorna producerats... vet inte riktigt hur noga man få reda på...men i alla fall inte om man är ute efter land och provins..... Särskilt på Slussen är det lätt eftersom man har nära kontakt med sina leverantörer
Info water source	Ex: Yes it's same here (aiming at water consumption)...never thought about it, but my guess is that probably thats very hard to find out...but I have actually no clue..	Ex: Ja.. det är samma där (syftar på info om vatten konsumtion)..har aldrig tänkt på det, men min gissning är att det nog är väldigt svårt att få reda på.. men jag har faktiskt ingen aning..
Certifications today (KRAV	Ex: (if water consumption is included) Nej I dont think so..that's probably only pesticides they care about	Ex: (om vattenkonsumtion är inräknat) : Nej det tror jag inte.. det är nog bara bekämningsmedel som de bryr sig om..
Food WF		
Opinion	Ex: Yes, it would be interesting...but it depends	Ex: Jo, det skulle vara intressant ...men det beror på
Uses	Ex: Certificications could be intersesting (does not reflect at all to consider it by himself). But not as a new cerification...that would feel unnecessary...but if it can be inculded in an already existing certification, like Krav for instance, that would be good.	Märkning skulle vara intressant..(Inte en tanke att göra några beräkningar själv). Men inte som egen märkning... det skulle kännas onödigt.. men om det skulle kunna bakas ihop med någon märkning som redan finns, som Krav till exempel, det skulle väl va

Coding scheme for Qualitative Content Analysis of Interview with Hotel owner		
Environmental performance	**Quotes English translation**	**Ouotes Swedish original**
General	Ex: There has always been a private interest, with awareness about the environment and so...then when starting to run a hotel and restaurant this way of thinking has been included in the business as well...but maybe a bit unstructured, more unsystematical	Ex: Man vart intresserad privat, med medvetenhet o så kring miljön kan man säga.. sen så då när man börjat driva hotell o restaurang så har man ju då tagit med sig det tänket in i verksamheten också.. men kanske lite ostrukturerat, mer osystematiskt mer sådär..
Structure	Ex: Then we decided that we wanted our environmental commitment to be more systematical at our place and then, in the same eh... At the same time we got an offer to have an environmental label (Svanen)	Ex: så bestämde vi oss att vi ville ha ett mer systematiskt miljöarbetet på stället och då i samma eh.. ungefär samtidigt fick vi ett erbjudande att vi kunde svanenmärka
Indicators	Ex: (About Svanen) We became more conscious when buying new stuff and so on...and we simply became more consistent in our work	Ex: (Om svanen) Vi fick mer medvetenhet när vi köpte in nya grejer och så vidare.. och blev helt enkelt mer konsekventa.
Measurement	Ex: ...and now with the new (water) meters... We can compare month by month and also year by year. And then we can put it in relation to guest night and so on.	Ex: ...och nu med dom nya (vatten)mätarna... kan vi jämföra månad för månad och också år efter år. Och sen så kan vi ju ha det i relation till gästnatt och så vidare
Benchmarking	Ex: No...we dont compare with others..we have you know our own scale...often it is you know very difficult..	Ex: Nej.. vi jämför inte med andra, vi har ju...vi har ju vår egen måttstock så att säga..ofta är det ju väldigt svårt
Implementation		
Changes in routines	Ex: (Question about if there have been changes assossiated with environmental commitment) Yes definitely...it is a lot about routines for cleaning and also routines waste management (recyceling)	Ex: (Fråga om ifall miljöarbetet bidragit till förändringar) Ja det har det ju absolut gjort...det handlar ju mycket om städrutiner och sophanteringsrutiner också.
Staff "reactions"	Ex: It is fun for them with this environmental values...because they are proud of our certification...that we are working with this	Ex: Det roligt för dom att ha dom här miljövärdena..för att dom är stolta av vår miljömärkning..att vi ska jobba med det här
Difficulties	Ex: Difficulties? (among staff) No, it's the opposite..! ..This is something that is engaging the staff...they often come up with suggestions and so..	Ex: Svårigheter? (med personalen)Nej, tvärtom..! ..det här är ju en sak som får personal att engagera sig...dom kommer ofta med förslag på förbättringar och så.
Difficulties 2	Ex: Well what can be a bit difficult ...is maybe for the chefs...they somtimes have difficulties with saving water...with the taps	Ex: Det som kan vara lite svårt i för sig.. det är kanske kockarna.. dom kan ha lite svårt att spara på vattnet i för sig...med kranarna
Resistance	Ex: But definetely not of restistance or so.. (the chefs) ..it's more just that it's a bit hard for them... to think about it	Ex: Men absolut inget motstånd eller så.. (kockarna) ...egentligen det är bara det att de är svårt för dom... Att tänka på det
Habits	Ex: (regarding removed cleaning chemicals) but they still understand why... And yes, it's mostly a question of breaking habits I think...but yes..now its not a problem.	Ex: (borttagna städprodukter) dom förstår ändå varför .. och ja det är mest en fråga om att bryta vanor tror jag...Men ja... nu är det inget problem
Food WF		
Info location	Ex: My opinion is that you always now where it (the food) comes from... Then I dont know if you can find out exactely where within a country...I mean, there are great regional differences	Ex: Min uppfattning är att man vet alltid varifrån det kommer (maten)... sen vet jag inte om man kan få reda på pricken var i ett land...det är ju väldigt stora regionala skillnader...
Info water source	Ex: Hm...no,no I dont think that is possible...yes well not if you should calculate it on your own...it is not reasonable	Ex: Hm..nej,nej det är nog inte rimligt ... ja inte om man skulle räkna ut det här själva..det är ju inte rimligt..
Difficulties	Ex: Well it takes..eh..that someone else do the calculations...then, well it can not be to complicated...so you again end up with those rutabagas	Ex: Det krävs ju ..eh..att det är någon annan som räknar ut...sen får det ju inte bli för komplicerat.. så att till slut att man kommmer tillbaks till dom där kolrötterna
Opinions	Ex: (Is Food WF intersesting) I definitely think so...I mean, I'm interested in all these kinds of questions... But no, it shouldn't be too complicated...It must be simple... And if you could measure it	Ex: (Är mat WF intressant) Det tycker jag absolut ..jag är ju intresserad av alla sådana här frågor.. men nej det får ju inte bli för komplicerat.. det får ändå va enkelt.. Och om man kan mäta det

Appendix 4 - Coding scheme documents

Example:

Categories	Product WF assessments (Coca-Cola)	The Accor's group EF
By who and for who	For the coca-cola company, a collaboration between them and The Nature Conservancy. Reserchers and consultans conducted calculations	For Accor Group by PwC (consulting and auditing firm)
Objective (added)	To adress growing challanges related to freshwater, as a tool to measure and understand water use troughout the supply chain	As a part of, "Accor decided to assess its full environmental impact". Understand the environmental issues behind what it does and thereby build the best possible
Scope of WF	0,5 liter cola pet-bottle. Indirect water use in the supply chain (bottle packaging and ingredients) plus direct operational water use.	Food supply chains
Method	Following methodology of the water footprint network	Life-cycle analysis method, from the point where the rawmaterials are exratced until end of life. PwC cross-refered Accor's information by scentific
Time	Pilot studies (3) consucted from 2008 to 2010. Only one was for the cola bottle	(Not only WF but hole EF) A year of groundwork with consult
Result	Green WF is 15 litres, blue WF is 8 litres and grey WF is 12 litres. Total 35 litres. The blue and green mostly assosiated with sugar beet production,	Food services (not specifed) consume 467,000,000 m3 water. Accor conume 544 m3 as much as 438 000 europeans every year. From accors total WF is 86%
More result (added)	the operational WF 0,4 litres blue water, supply chain mostly grey water, 7 litres. Ingredients 28 litres, more than half green.	Fruit and vegetables needs in general less water than livestock.There is environmental advantages of changinf a few of our eating habits.
Impact assessement	To assess potential impacts the researchers focused on the largest compnent, sugar beet grown in the Netherlands.	No clear data
Local conditions	Dutch sugar beets are grown in a region of relative water abundance and the crops are primary rain-fed. Minimal external blue water needed. Eutrophication is a	is considered.. "especially in areas under water stress"
Impact results (added)	No significant impacts of green, blue water use (sse local conditions). For grey water, applied rates of nutrients higher than the uptake of the crops, runoff can	Water consumption onlu one issue. Accor can impact water recources, trough firtilising and crop-protection products

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Data and Standard values	For sugar beats, site-specific data provided by the sugar companies. Assumed that 10% of the applied nitrogen fertilizer leaches to groundwater.	No clear data
"Errors"	When looking deeper into sugar beet the WF was 12% than estimated in coca-cola pilot study.	Not available information
Uncertainty	Some assumptions, no available data	Not enough information in all fields, for isntance waste water treatment is not inlcuded because of this.
Learnings (added)	More than two-thirds of the total WF comes from blue and green water used in the supply chain to grow sugar beets. About one-third is grey water within in	Key learning is that food purchases account for most of the water we consume and contaminate. Cast light on several impacts that people rarely
Implications	A closer look at the water footprints of sugar produced from sugar beets. Coca-cola system will continue to focus on improving water efficuency and ensuring	The study mapped out the main areas where Accor has an impact on the planet (whole EF) Putting pressure and working with most advanced food processing
Use of WF	To show the need to look at the components of water footrpints seperately. To understand their supply chain. For decicions.	To further develop Accors sustainabliy commitment, to improve environmntal strategy and for supporting desicions in developping new action plan
Help for env performance	Help to understand were in the production of the coca cola most water is used.	A whole new understanding. Pressure on suuply chains and goal to promote more balanced and smarter menus in its restaurants.
Benchmarking	No data	Comparision wihtin the different hotel chains and hotles in Accor group