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Water Management and Corporate Social Responsibility

Norwegian companies' experiences and
strategies of water usage in India as a
response to international water initiatives

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Globalization

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Preface

This study is a master's thesis of MSc in Globalisation, specialisation in Global Politics and Culture at the Norwegian University of Science and Technology (NTNU) in Trondheim, Norway. The study is conducted during spring 2014, at the Department of Industrial Economics and Technology Management under the supervision of associate professor John Eilif Hermansen.

Parts of this study are based on a report from an internship at Innovation Norway in New Delhi, India, autumn 2013. This especially applies for the introduction and the case presented in this study. Working with the master's thesis has at times been challenging, but has given me valuable experience and motivation for future career.

First of all, I would like to thank my supervisor John Eilif Hermansen for giving me valuable advise and support during the semester. I would also like to thank my colleagues at Innovation Norway in New Delhi for welcoming me and giving me the possibility to conduct my research project among Norwegian companies in India. Thanks to the participating companies for their willingness to share information and thoughts with a master student from Norway. Standards Norway has been very helpful and given me access to the draft of the new ISO standard on water.

Thanks to friends and family for all support and for reminding me that there are other things in the world than a master's thesis.

Stine Mari Harildstad
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Abstract

Climate change exacerbates already pressing challenges for the global water situation. Reports by the UN and the Intergovernmental Panel on Climate Change (IPCC), states that climate change is likely to exacerbate many of the already pressing factors for India's natural resources. India is predicted to be a water scarce nation within few years and the industries also needs to focus on the pressing challenges. The main focus in many corporate social responsibility (CSR) strategies is on labour rights. There is little information available on how Norwegian companies deal with environmental issues when operating internationally. This study exemplifies how and why water issues should be a part of a company's CSR, and what initiatives that is relevant for companies in India. This study describes the linkage between the water footprint concept on a macro level, and how companies can work with the water footprint on a micro level. Based on international water initiatives, the purpose of this study is to suggest a model for sustainable water use that Norwegian companies can use as a part of their CSR-strategy.

This study starts with an introduction to the topic and the research, followed by a description of the methods applied to answer the research questions. The theoretical framework presents different aspects of water in a global world, and relevant concepts and initiatives on water management and water risk. The water situation in India is presented as a case, with Norwegian companies as subunits for analysis. The selected companies represents four different water-intensive industries, food, apparel, paint and energy. Semi-structured interviews form the basis for an analysis of Norwegian companies experiences, and what types of water-related business risk companies face in India. The results of this study are suggestions of criteria for sustainable water use, and a four-phase model for how Norwegian companies can involve water use in their CSR.

Sammendrag

Den globale vannsituasjonen har alvorlige utfordringer, som blir forverret av klimaforandringer. Rapporter fra FN og Klimapanelet (IPCC) slår fast at klimaforandringer trolig vil forverre situasjonen for Indias naturressurser. Det er forventet at India kommer til å lide av vannmangel innen få år, og det er et behov for at industrien også fokuserer på de alvorlige utfordringene. Hovedfokuset i mange strategier om bedrifters samfunnsansvar (CSR) er på arbeidernes rettigheter. Det er lite informasjon tilgjengelig om hvordan norske bedrifter som opererer internasjonalt håndterer miljøproblemer. Dette studiet viser hvordan og hvorfor vannproblematikk bør være del av bedrifters samfunnsansvar, og hvilke initiativer som er relevante for bedrifter i India. Dette studiet redegjør for sammenhengen mellom Water Footprint-konseptet på et makronivå, og hvordan bedrifter kan jobbe med Water Footprint på et mikronivå. Basert på internasjonale initiativer, er hensikten med dette studiet å foreslå en modell for bærekraftig vannforbruk som norske bedrifter kan bruke som en del av sin CSR-strategi.

Dette studiet starter med en introduksjon til temaet, etterfulgt av en beskrivelse av metodene anvendt for å besvare forskningsspørsmålene. Det teoretiske rammeverket presenterer ulike aspekt ved vann i en global verden, i tillegg til relevante konsepter og initiativer innen vannstyring og vannrisiko. Vannsituasjonen i India er brukt som case, med norske bedrifter som underenheter for analyse. De utvalgte selskapene representerer fire ulike vannintensive industrier, mat, klær, maling og energi. Semi-strukturerte intervjuer danner grunnlaget for en analyse av norske bedrifters erfaringer, og hvilke typer vannrelatert forretningsrisiko bedrifter møter i India. Resultatet av dette studiet er forslag til kriterier for bærekraftig vannforbruk, og en modell med fire faser for hvordan norske bedrifter kan involvere vannforbruk i sitt samfunnsansvar.

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Acronyms

CDP	Carbon Disclosure Project
CEO	Chief executive officer
CSR	Corporate Social Responsibility
GRI	Global Reporting Initiative
FAO	UN Food and Agriculture Organisation
FICCI	Federation of Indian Chambers of Commerce and Industry
IBAW	Indian Business Alliance on Water
ILO	International Labour Organisation
IPBES	Intergovernmental Platform on Biodiversity and Ecosystem Services
IPCC	Intergovernmental Panel on Climate Change
ISO	International Standard Organisation
IWT	India Water Tool
LCA	Life Cycle Assessment
GEMI	Global Environmental Management Initiative
MDGs	Millennium Development Goals
MNCs	Multinational corporations
MNEs	Multinational enterprises
NAFTA	North American Free Trade Agreement
NGO	Non-governmental organisation
OECD	Organisation for Economic Co-operation and Development
UNEP	United Nation Environment Programme
UN GC	United Nations Global Compact
UNWWD	United Nations World Water Development
WBCSD	World Business Council for Sustainable Development
WEF	World Economic Forum
WF	Water Footprint
WFN	Water Footprint Network
WRI	World Resources Institution
WTO	World Trade Organisation
WWAP	World Water Assessment Program

Introduction

Providing a safe and reliable supply of water already poses a challenge for water managers throughout the world. Almost 900 million people lack access to improved drinking water, and another 2.5 billion lack proper sanitation. Population and economic growth will likely exacerbate these challenges.

Morrison, Morikawa, Herberger et al. (2009:4)

Feeding a growing world population will increase the already high water demand in agriculture. The environment and water resources in the industrialised world have suffered from over-allocation and pollution. Climate change exacerbates these challenges for the global water situation (Morrison, Morikawa, Herberger, et al., 2009). In India, with its large population, there is an increasing demand for efficient policies and regulations on water use. India is predicted to be a water scarce nation within few years and the industries also need to focus on the pressing challenges (CDP, 2013). Norwegian companies operating in India have to deal with these challenges and contribute to positive development in environmental responsibility in India.

The main focus in many corporate social responsibility (CSR) strategies is on labour rights. There is little information available on how Norwegian companies deal with environmental issues when operating internationally. Companies can meet challenges with help from international guidelines, reports and standards. Based on international water initiatives, the purpose of this study is to suggest a model for sustainable water use that Norwegian companies can use in their CSR strategy.

Predictions by the Intergovernmental Panel on Climate Change (IPCC) claim that there are four factors that will lead to water scarcity in the future; population growth, urbanization, change in market conception patterns and climate change. IPCC indicate that climate change can lead to increased precipitation in the tropics and at high latitudes, and decrease in the sub-tropics. Ecosystems, human development and food security all over the globe will be affected by the future availability of freshwater resources. The IPCC 5th assessment confirms and strengthens earlier predictions (IPCC, 2014a; Udaya Sekhar, Gosain et al., 2012). The UN World Water Development 2014 states that there will be an increased demand for water in the future, with an increase of 64 per cent in industrial water use, only in Asia (WWAP, 2014). A new ISO standard in the environmental management 14000-series, ISO 14046 Water

Footprint is to be published and will provide standardised methods for calculating and reporting on water use (ISO, 2013). These three documents, that have been or are to be published during the first months of 2014, are highly relevant for this study and will form the basis for the theoretical and analytical framework. The first section presents the context and the research questions the study.

1.1 Background

The market is often seen as precisely the mechanism that might enhance environmental causes, with companies having to adjust their practices in the face of global concern over environmental harm, so as to compete for consumers.

El-Ojeili and Hayden (2006:73)

Globalisation involves increased trade liberalization and increased dependency and cooperation between nations all over the world. As a result of the sustainable development discourse, the UN came up with the Millennium Development Goals (MDGs) in 2000, with eight goals to be reached by 2015. The eight goals target different development issues that concern the globe today. The MDGs was designed to highlight global development issues and develop global partnerships for development. The UN initiative Global Compact is one such partnership that facilitates sustainable development and technological transfers between developed and developing countries (El-Ojeili & Hayden, 2006; Mukheibir, 2010).

1.1.1 Globalisation of water

The Millennium Development Goal 7 is to ensure environmental sustainability and one of the targets for MDG 7 goes directly on water, aiming to reduce “the proportion of people without adequate access to affordable water by half by 2015” (Mukheibir, 2010:1027). Barely 3 per cent of the water on our earth is freshwater, however, most of this water is frozen water, in glaciers in the Antarctica and the Arctic. This means that only 0,5 per cent of the worlds water is available for humanity and ecosystems (Lambooy, 2011).

Competition between people and companies when it comes to access to water can be a problem if companies overuse freshwater in a certain area so it threatens individual people’s water supply. The world is on its way to reach “peak water”, when freshwater is consumed faster than it is replaced (Gleick & Palaniappan, 2010; Morrison, Morikawa, Herberger, et al., 2009). Climate change affects both the availability and the quality of water, at the same time

the demand for water will increase. Most people are affected by climate change, some more than others. Climate change and its direct consequences on the global water cycle require a reorganization of water regulations both by nations and international community. Climate change and the future availability of freshwater resources make it difficult to achieve the Millennium Development Goals in developing countries. (Cullet, 2011; Udaya Sekhar et al., 2012).

There is a direct correlation between population growth and the increase in freshwater consumption. As human populations grow, as standards of living improve, as industrial productions expand, and as the need for food in dry areas increases, the need for irrigation, water supply systems are increasingly likely to become both objectives of military action and instruments of war.

Chapagain (2006:2)

Globalisation of water brings some opportunities for nations, since virtual water¹ is a cheap alternative in water scarce areas. Nations can use virtual water as a tool to decrease the pressure on their domestic water resources, by importing water-intensive products, and exporting products that require less water. A downside of the globalisation of water is that the price for water use is not included in the imported product. Another downside is that many countries are dependent on import of water-intensive products, but importing products from multiple trade partners can decrease this risk (Hoekstra & Chapagain, 2008).

1.1.2 Water use in industries

The links between climate change and water are increasingly being discussed, and as a result, the sustainability and responsibility of companies and products are now issues considered by consumers and investors. New water policies are coming up, with stricter limits on water efficiency and wastewater discharge (Cullet, 2011; Gleick, 2012). In order to understand the global effects of freshwater use, Hoekstra and Chapagain visualised the hidden freshwater use in products. Some industries and products require huge amounts of water. As an example is the global water footprint² of one cup of coffee is 140 litres, while one cup of tea is 34 litres (Aldaya, Chapagain et al., 2012; Chapagain, 2006). Cotton production has a large impact on local water resources and requires huge amounts of water.

Cotton consumption is responsible for 2.6 per cent of the global water use. As a global average, 44 per cent of the water use for cotton growth and processing is not for serving the domestic market but for export. This means that - roughly spoken - nearly half of the water problems in the world related to cotton growth and processing can be attributed to foreign demand for cotton products.

Chapagain (2006:119)

¹ Import of water-intensive products; see also Section 3.2.3 for more on the concept of virtual water.

² The total amount of freshwater required for one product.

Companies need to involve the water use in their supply chains, as the supply chain water footprint generally is much larger than the company's own operational water footprint (Aldaya et al., 2012).

1.1.3 Norwegian presence in India

Norway has a long history in India, starting with the Danish-Norwegian colonial times in the 17th century, continuing with shipping and mission in the 1800s and development cooperation since the 1950s. Norway contributed for many years to several aid projects in the Southern parts of India, especially fishery projects in Kerala. Today, Norway's relation to India is through a more equal partnership with trade and investments both ways (Norad, 2012). Indian companies in the maritime, the oil and gas sector especially appreciate Norwegian knowledge and partnership. The trade between Norway and India has been increasing in the recent decades. Main commodities exported to Norway from India are textiles, apparel, shoes, metals, furniture, fruit, vegetables, tea and spices. While the main items exported to India from Norway are machinery iron and steel, telecom, maritime and off-shore equipment, and services (Innovation Norway, 2013b).

1.1.4 Challenges for Norwegian companies in India

India is the largest democracy in the world, the seventh biggest country by area and the second most populous country in the world. The main drivers of India's emergence as a regional and global power have been a tremendous economic growth after economic reforms in the early 1990's together with a large high-skilled young population. However, the country faces pressing challenges as overpopulation, poverty, corruption and environmental degradation (World Factbook, 2014). Increasing challenges are environmental issues, like pollution, availability of safe drinking water and waste management (Innovation Norway, 2013a).

Both Norwegian and Indian governments are pushing for stronger policies in relation to corporate social responsibility (CSR), to be able to face challenges as laws, labour rights, corruption and environmental degradation. With a strong CSR-profile, Norwegian companies operating in India have the potential to be at the forefront of this development, and to increase their ability to tackle market specific challenges while strengthening their triple bottom line.

The most relevant issue for Norwegian companies regarding CSR in India is to follow up the supply chain and the network of suppliers and sub-suppliers. In India there is little control over the working conditions, and it is assumed that only 10% of the workforce is in the formal sector. Another challenge is labour laws, since India has not ratified the International Labour Organizations (ILO) core conventions about the right of organization and child labour. Child labour is still a huge problem in some sectors and India has the highest number of child labourers younger than 14 years (Innovation Norway, 2013a). Corruption is still one of the biggest challenges in the country, present in all levels of society. India is ranked as nr 94 out of 177 countries, with a score of 36, where 0 is clean and 100 is extremely corrupt. India has experienced a nationwide movement against corruption in recent years, but there is still a long way to go, especially when it comes to bribery (Transparency International, 2013).

1.2 Previous research

Global trends during the past two decades, like water scarcity and insufficient environmental flows, have put water on the agenda. The last decade there has been a growth of interest in the field of water, virtual water and water footprint among researchers, students and policy makers (Hoekstra & Chapagain, 2008). According to (Gleick, 2012) there is a need for further research on sustainable water management, including better data and case studies.

Lambooy (2011) explores the role of companies in relation to freshwater and finds that companies are expected to take responsibility for their impact on water resources. The Coca Cola Company and other beverage companies have served as case in several studies of water management. Daniel and Sojamo (2012) analyse the major food and beverage corporations' motivations and strategies of participating in debate of a global water governance regime. The study found that several companies have moved from an internal water risk management to reducing water risks throughout their value chain and in this way created shared value with stakeholders. Drew (2008) analysed the organized civil society resistance to big multinational corporations monopoly over water in India, and argues that there will be an increased degree of movements against water privatisation. Ercin and Hoekstra (2014) presents the first global water footprint scenario for 2050, the study can form the basis for further assessment of how human activity can affect freshwater resources in the future. The study found that if the consumption patterns are changed it is possible to reduce humanity's water footprint to more sustainable levels, even with an increasing population. Verma, Kampman et al. (2009) found

that the virtual water trade between Indian states exacerbating scarcities in already water scarce states, as virtual water flows are moving from water scarce to water rich regions of India.

1.3 Research questions

Innovation Norway is represented in all Norway's counties and with offices in more than 30 countries. The Innovation Norway office in India provide knowledge about business culture, market advice and other strategic information for companies, cluster and networks in Norway (Innovation Norway, 2013b). Autumn 2013 the author had a research project at Innovation Norway in New Delhi about attitudes to corporate social responsibility (CSR) in 13 Norwegian companies operating in India. The research project found that CSR increasingly is an important part of the management, however, the challenge for Norwegian companies in India is that the Indian and the Norwegian managers have a different understanding of what CSR involves for the company. The research also found that there are little environmental concern in Norwegian companies' CSR-strategies. The main focus is on issues like HSE, labour rights and human rights. These are important issues in a country like India, however, there a need for action on pressing issues as environmental degradation (Harildstad, 2013).

This study will examine how water issues in India are affecting Norwegian companies. The focus in this study is on business activities, the risks and how a company can improve. Based on the increasing internalisation of Norwegian companies and on theory on water management, the research questions to guide this study are as following:

- How can CSR be linked to water use?
- What are relevant concepts and initiatives for water use and water risk?
- What kind of water risks do Norwegian companies face in India?
- How can Norwegian companies involve water use in their CSR?
- What can a possible model for sustainable water use be?

1.4 Purpose and objectives of study

Based on data collected during an internship in India, fall 2013, the purpose of this study is to present an overview of the water situation in India today, and suggest a model for sustainable water use for Norwegian companies to use in their CSR strategy. This is done by analysing

the current water situation in a CSR context in India and how Norwegian companies deal with water issues in their CSR. The research objectives for this report is a selection of Norwegian companies present in India, representing four different industries; food, apparel, paint and energy. The focus in this study will be on water-intensive industries, however, it can be relevant for other industries.

1.5 Outline of study

Chapter 1 has presented a brief background of the water situation globally and in India, together with research questions to guide this study. Chapter 2 describes the methodology and the research design used in this study. Chapter 3 presents a global overview of different aspects of water, the main theories on water, corporate social responsibility and how to measure sustainable water use. Chapter 4 presents the water situation in India as a case, with Norwegian companies as subunits. Chapter 5 analyses the Norwegian companies experiences with environmental CSR in India, and what types of water-related business risk the industries face in India. Chapter 6 discusses what the water risks involve for Norwegian companies, and suggests some criteria for sustainable water use. Concrete recommendations for how Norwegian companies can involve water issues in their CSR are given and summarised a model. Chapter 7 discusses the results and recommendations generated from this study. The quality of the results and the methods is also discussed here. Concluding remarks are found in Chapter 8.

2 Methodology

This study will examine the water issues for Norwegian companies in India, this chapter presents the research design and methods applied. Semi-structured interviews with Norwegian companies in India and relevant theories on water management and corporate social responsibility will guide the analysis to answer the research questions.

2.1 Research design

A qualitative case study was chosen as research design to answer the research questions. A qualitative method is chosen since this method has several advantages in describing and goes in-depth of a phenomenon in social science. The case study method is chosen to be able to give a detailed examination of the research problem in particular a single case, and to take a holistic approach to the study (Matthews & Ross, 2010). According to Yin (2014) is a case study research valuable when the researcher can ask “how” or “why” question about a contemporary set of events that the researcher does not control.

A case is often associated with a location. Following Yin’s criteria for selection of case studies, this study will be a common or representative case as the research seek to examine the implications of theory of water management and CSR on Norwegian companies experiences in India (Bryman, 2012; Yin, 2014). A representative case is chosen “because it is seen to represent many other similar cases” (Matthews & Ross, 2010:128).

This study is a single-case study following an embedded case design. The case for analysis will be the water situation in India in a CSR context, with Norwegian companies as subunits for analysis (Yin, 2014). The research design in this study follows an evaluatory research strategy, which means that the analysis and discussion in this report seeks to find out what works, and evaluate and identify areas for improvement that again can have value for others in the same or similar area (Matthews & Ross, 2010). Primary data collected through semi-structured interviews is used as background data about the CSR-situation in some companies with a Norwegian owner or partner.

2.2 Data collection and sampling

Data used in this study are from both primary and secondary sources. Primary data are conducted through semi-structured interviews with representatives from the selected companies, however secondary sources of data have also been used.

2.2.1 Literature

Secondary sources are previous research on the field, and relevant scientific journals about water and business management. Literature search is mainly done in the scientific database Scopus. The main literature used in this report is found by using the keywords “Globalisation” OR “CSR” AND “Water” AND “Sustainable management”. This specific search generated 66 results in Scopus, and by adding “Footprint”, the search was narrowed down to three books and articles that forms the base for the theoretical framework in this study. These are *Water footprint scenarios for 2050: A global analysis* by Ercein and Hoekstra (2014), *Globalization of water: sharing the planet's freshwater resources* by Hoekstra and Chapagain (2008), and *Corporate social responsibility: sustainable water use* by Lambooy (2011).

Reports as the Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report, and the United Nations World Water Development (UNWWD) report 5 “Water and Energy” are considered as important for the overall approach of water issues. To understand the water issues for business two articles, “*Climate Change and the Global Water Crisis: What Businesses Need to Know and Do*” by Morrison, Morikawa, Herberger, et al. (2009) and “*Water Scarcity & Climate Change*” by Morrison, Morikawa, Murphy et al. (2009) for the Pacific Institute for studies in Development, Environment, and Security, are highly relevant. Standards for CSR and environmental management by the International Standard Organisation (ISO), especially ISO 26000:2010 Social Responsibility and access to the draft of the new ISO standard on water footprint, ISO 14046, are important for the analysis.

2.2.2 Semi-structured interviews

Semi-structured interviews have been used in order to look at people’s attitudes about a certain topic and how people experience the company’s attitudes towards CSR. Semi-structured interviews are chosen rather than questionnaires to know how people express themselves and what experiences they can add. A flexible interview guide allows the

participants to talk more freely about the situation in their company, and also help the researcher to cover the same areas in all interviews (Matthews & Ross, 2010). The main topics covered by the interview guide are definitions of CSR in the company, guidelines, and cooperation with partners. The interview guide was built up to get more in-depth information about the company and their attitudes and knowledge about CSR. The interview guide can be found in Appendix I.

2.2.3 Sampling

Case selection is an important part of a good research design, the sample in this study consists of established Norwegian companies in India. Cases selected for this study had to be companies that in one way or another have close ties to Norway and the Norwegian parent company. A small number of cases were chosen out from their CSR-profile for in-depth studies. The following five dimensions had to be covered; (1) The sample had to consist of both small and large companies, where (2) about 50 per cent should have participated in a previous survey by Innovation Norway. (3) The company should be both established and newly established in India, (4) with an office in India, not just operating through an agent (the agent may not be representative for the company, since the agent may represent several interests and companies.), and finally (5) all sectors should be represented. The informants were the persons responsible for CSR in the company, and in most cases, this was the country manager or the human resource manager.

The original sample for the internship project consisted of 13 companies and was chosen through purposive sampling, which means that there was not a random sample, but a sample chosen with purpose (Matthews & Ross, 2010). Because of time limitations, four of these 13 companies were chosen for further analysis in this study. These four companies represent four different water-intensive industries in India, paint, food, energy and apparel.

2.3 Validity and reliability

The criterion for validity and reliability is important to evaluate in which degree the data and theory is relevant to answer the research questions. Validity mean if the study is observing or measuring what the research questions asks for. The internal validity is to which degree there is a good match between observations and theoretical ideas developed as a result of the study, while the external validity is to which degree it is possible to generalise out of the results in

this study. External reliability is to which degree others can replicate this study (Bryman, 2012). The number of informants is important for qualitative studies, since a limited number of informants decrease the chance of a reliable generalization (Matthews & Ross, 2010). Due to the timeframe of this research, there are a limited number of informants and it could be that the data cannot be generalized from the sample. Since primary data is limited, important stakeholders in order to maintain the validity and the reliability of the data are research and documents from the global initiatives.

In qualitative research can methodological triangulation ensure the validity of the study, this means that more than one source of data is used to study a social phenomena. This study uses triangulation to pursuit the research goal, which is to develop model for sustainable water use. To accomplish the research goal, research and documents from global initiatives are used to support the findings from qualitative semi-structured interviews with different water-intensive companies (Bryman, 2012; Yin, 2014).

2.4 Ethical issues

There is no serious concern for research ethical issues in this study since no personal sensitive data are collected. However, the companies where informed about the aim and purpose of this study and could choose whether they would participate in the interviews or not. It was also informed that it would be possible to make contact after the interview is done, in case they had more information to add, or if they had questions about the research.

2.5 Limitations of research

The analyses in this study is based on some Norwegian companies involvement in India, it does not cover all Norwegian companies and not other regions. The water situation in India is used as a case and the study does not seek to describe the water issues in other countries. The analysis is based on what the informants said in the interviews. It has not been time to go in-depth in each company and find out if the companies do what they claim they are doing.

3 Theoretical framework

Water involves different aspects, and can be managed and measured with different tools. This section presents the theoretical framework that is relevant for the analysis. This section also elaborates on the topic corporate social responsibility, and how CSR can be linked to water. The overall framework and initiatives available for companies are presented in the last part of this Chapter.

3.1 Water as a global resource

Water has historically been a local resource, however, water is as much a global resource as oil, with all the implications that involves. Freshwater is a fundamental resource that is unevenly and irregularly distributed. Water can be a service offered by a private or public actor, or water can be a commodity, tapped on bottles and sold next to mineral water and energy drinks (Hoekstra & Chapagain, 2008). Some of the different aspects of water are presented in this section.

3.1.1 Water as ecosystem

Water is a huge global and local biogeochemical cycle that is the basis for the ecosystems services, a resource that people and companies need for everyday life. Water is an essential part of our ecosystem and all living creatures are dependent on water. Freshwater is a resource that in many cases can't be replaced, like other resources as oil and gas (Morrison, Morikawa, Murphy, et al., 2009). Freshwater can be divided in three categories: blue, green and grey water. Blue water is fresh surface and ground water, green water is rainfall water stored in the soil, and grey water is polluted water (Chapagain, 2006; Hoekstra & Chapagain, 2008).

3.1.2 Water as social good

Access to clean water can be considered a social good, as it is fundamental to survival and also critical to avoid water-related diseases. Therefore, water supply requires governmental control and regulation (Gleick, Wolff et al., 2002). The Universal Declaration of Human Rights from 1948 does not mention water directly, however, access to safe water must be considered as a basic human right, since it is essential to achieve an adequate standard of

living and health (Hoekstra & Chapagain, 2008). On the United Nations General Assembly in 2010, 122 countries in favour to none against, with 41 abstentions, voted for the recognition of a free standing right to water and sanitation. International law does not officially recognise right to water as a human right, however, a growing number of governments in developing countries have stated this right in their constitutions. Still, in many regions in the world the situation remains critical (Human Rights Watch, 2014; Morrison, Morikawa, Murphy, et al., 2009; United Nations, 2010).

One step taken by the international community to involve food and water have been the Millennium Development Goals (Hoekstra & Chapagain, 2008). The MDG 7.C aim to “halve, by 2015, the proportion of the population without sustainable access to safe drinking water and basic sanitation” (UN Millennium Goals, 2014). The critique against the MDGs has been that the goals lack a clear action plan and failure of meeting this basic need for all people have resulted in a rethinking of national and international water regimes (Gleick et al., 2002).

3.1.3 Water as economic good

Because water is important to the process of economic development, essential for life and health, and has cultural or religious significance, it has often been provided at subsidized prices or for free in many situations. In theory, though not always in practice, this makes water available to even the poorest segments of society.

Gleick et al. (2002:i)

Water has several roles, socially, culturally and ecologically, and it is claimed that water can not be protected by purely market forces (Gleick et al., 2002). There is a new controversial idea that water should be considered as an economic good, as “subject to the rules and power of markets, multinational corporations, and international trading regimes” (ibid:i). Water is by international trade organizations as WTO and NAFTA defined as a tradable commodity. The privatisation of water has been a source for protest all around the world. This because once out one the marked, water is not freely available for everyone, only for the ones that can afford to pay (Chapagain, 2006).

Water can be a commodity that involves capital, labour and land. However, most of the time is not social and environmental impacts of water translated in the price of the product. The consumers generally don't pay for, or are not even aware of the water problems in the country the product is being produced in (ibid, Hoekstra & Chapagain, 2008).

3.1.4 Water as geopolitical resource

Water can in many regions be a direct source of conflict. This is especially relevant for inter-country basins, where the waters resources are shared by several nations. Risks that can affect the availability of water and make water a security risk can be population growth, climate change and war (Agnew & Woodhouse, 2011; Chapagain, 2006; Jones, Vardanian et al., 2009). Political borders rarely follow borders of water, there are 263 trans boundary river basins in the world that can be a potentially source for international conflict (Gleick, 2012).

Nations can be water dependent in two different ways; on water that flows into their country from another nation or on virtual water import. Egypt's dependency on water from the river Nile, which originates in the neighbour countries Sudan and Ethiopia, is an example of the first one. Such dependency shows that water is an important geopolitical resource that affects the relationship between two or several nations. An example on the other type of water dependency is prevalent in countries characterized by water scarcity, such as Kuwait, Israel, Jordan, Lebanon and Malta, which are countries that import more than 50 per cent of their virtual water, while the average virtual-water import dependency for countries is 16 per cent (Hoekstra & Chapagain, 2008).

The link between water availability at the local level and the global water cycle is not a new phenomenon. Further, there is no novelty in the fact that no individual country can control the global water cycle.

Cullet (2011:234)

Cullet (2011) claims that control over water is an important tool to power. In the tense situation between Ukraine and Russia during spring 2014, Ukraine closed the water access to the peninsula Crimea on April 26th. This was seen as a reaction to Russia's constant threats and provocations in Eastern Ukraine (NRK, 2014). An international water regime is problematic because water is still politically sensitive since states want to maintain control. The solution is a change in water laws and that water should be considered a global common heritage. Pressure on freshwater resources comes from population and economic growth in addition to global climate change. The changing climate requires trans boundary agreements on water management to avoid conflicts. Greenhouse-gas emissions are causing large-scale changes to our climate system that will also have important impact on the hydrologic cycle. Reports by Intergovernmental Panel on Climate Change (IPCC) found that freshwater systems are especially vulnerable to climate change (Gleick, 2012).

3.2 Concepts

The Millennium Development Goal 7 about giving people access to safe and clean water also requires action from the private sector. There is a growing recognition that the private sector should take responsibility and do their part to address these challenges, both regionally and internationally (Morrison, Morikawa, Murphy, et al., 2009). Water is also an essential part for industries and economies, as the key ingredient in many products but also to cool industrial processes, dilute contaminants and as a solvent. Industrial water use can affect nearby communities and ecosystems (Gleick, 2012). This section presents key concepts when it comes to water.

3.2.1 Water scarcity

According to Mukheibir (2010) water security consists of three distance features, scarcity is the key feature, while access and vulnerability also are important features. Water scarcity is defined by a population-water equation, following the Falkenmark Water Stress Index a country suffers of water scarcity if there is less than 1000 m³ freshwater per person per year. Absolute scarcity is defined by less than 500 m³ freshwater per person per year. Today there are approximately 700 million people in 43 countries that suffer of water scarcity. This is especially the case in China, India and Sub-Saharan Africa (ibid).

The two largest countries in the world, China and India, still have a very high degree of national water self-sufficiency (93% and 98%, respectively). However, the two countries currently have relatively low water footprints per capita (China 700 m³/yr and India 980 m³/yr). If the consumption pattern in these countries changes into that of the USA or some Western European countries, they will be facing severe water scarcity in the future and will probably be unable to sustain their high degree of water self-sufficiency. A relevant question is how China and India is going to feed themselves in the future.

Hoekstra and Chapagain (2008:134)

3.2.2 Virtual water

Tony Allan first introduced the term virtual water in the early 1990s (Chapagain, 2006; Hoekstra & Chapagain, 2008), which is defined as “the volume of water required to produce a commodity or service” (Chapagain, 2006:6).

There are two approaches to virtual water; the first is from a production point view, where virtual water is quantified as the real water used for the production of the commodity. This approach is useful to see the impact of a product on the environment by calculating the total amount of water used to produce a product (Chapagain, 2006). The other approach of virtual

water is from a site specific view; “the virtual water content is defined as the amount of water that would have been required to produce the product at place where the product is used” (ibid:6). The second approach is useful to see how much water a country could save by importing a product versus producing it domestically, however, the problem with this approach is to calculate the virtual water content of a product in a country that cannot produce the products domestically (ibid).

For water-scarce countries, it could be attractive to achieve water security by importing water-intensive products instead of producing all water-demanding products domestically. Reversibly, water-rich countries could profit from their abundance of water resources by producing water-intensive product for export. Trade of real water between water-rich and water-poor regions is generally impossible due to large distances and associated cost, but trade in water-intensive products (virtual water trade) is realistic.

Chapagain (2006:7)

Virtual water can be an alternative to endogenous water resources for water scarce regions and has also been called exogenous water (Hoekstra & Chapagain, 2008). In the future, virtual water will be increasingly important, as food trade will continue to increase. Chapagain (2006) claims that the term virtual water is not included in the water discourse, all though, virtual water is the most significant water for many water-stressed countries.

3.2.3 Water footprint

The water footprint (WF) concept is closely linked to the virtual water concept and was introduced by Hoekstra in 2002 and further elaborated by Hoekstra and Chapagain. The WF is an indicator to measure the impact of consumption and to measure the total amount of freshwater needed for one product consumed by a well defined group (Gleick, 2012; Hoekstra & Chapagain, 2008). This new methodology enables a better understanding of the relationships between business and watersheds, and thereby increases the awareness of the water challenges all over the world. The water footprint is a good tool to see how dependent some nations or industries are on water, since this indicator look at the total consumption within a nation and not just the production. Freshwater use outside the nations’ borders is therefore also a part of the calculation (Chapagain, 2006; Gleick, 2012; Hoekstra & Chapagain, 2008).

The water footprint of an individual, business or nation is defined as the total volume of freshwater that is used to produce the foods and services consumes by the individual, business or nation. A water footprint of a nation (F) is generally expressed in terms of the volume of water use per year in a country.

Chapagain (2006:31)

A water footprint is divided into three separate components; blue, green and grey water footprints. The blue water footprint measures the volume of the water consumption that is taken from surface waters and groundwater. The water consumption taken from soils during the production process is measured by the green water footprint, while the third component, the grey water footprint is the amount of water needed to dilute pollution from water bodies (Gleick, 2012; Hoekstra & Chapagain, 2008). The three components affect the water system differently and the blue water should get more concern than the green water since blue water use affects the environment more than use of green water. While green water use goes back to the natural vegetation, the blue water is taken out from river systems and is therefore taken out of the water system. It is important to notice that grey, dilution water use needs attention as well, since pollution is done by choice and not by necessity (Chapagain, 2006).

3.2.4 Water risk

Globalisation of water involves a level of risk, in dependency on other nations and that nations need other resources to cover the import of virtual water. In 2014, the World Economic Forum (WEF) identified water crisis and extreme weather as two of the top 10 global risks. Industries and governments have realised that water scarcity can generate business risk, and that water security is not a local but a systemic global risk (CDP, 2013; Lambooy, 2011). Especially since the early 2000s, larger multinational corporations (MNCs) have started to address the water risk in their value chains and to communicate water-risk to their stakeholders (Daniel & Sojamo, 2012).

Water risk can be divided into three categories: physical, regulatory and reputational risk. The physical water risk is that companies have to change their supply chain due to disruptions from for example drought. Delaying or suspending of operational permits is a regulatory water risk. A clear plan and profile on water-related issues are important to maintain a good reputation among costumers, suppliers and stakeholder. The three types of risk can lead to a reduced costs and financial risk (CDP, 2013; Water Footprint Network, 2014a). Businesses can identify and understand their own water challenges through a risk framework of the three types of risk; physical, reputational and regulatory risk (Morrison, Morikawa, Murphy, et al., 2009). These risks can depend on internal and external factors. Companies have direct control over the internal factors, like maturity of practice, nature of use and discharge. External factors like hydrologic context, environmental, social and political context are harder to get

control over (Gleick, 2012). Corporate initiatives and tools for water risk are presented in Section 3.5.

3.2.5 Water management

Water is a shared resource that demands collective actions, however, management of such a resource can be sensitive, socially, culturally and environmentally. Water has recently risen to be an important strategic concern and increasingly water is becoming an integrated part of ensuring business viability and reducing risk. There is no substitute for water in many industrial processes and for human survival itself (Morrison, Morikawa, Murphy, et al., 2009). Corporate water management explores the risk that water poses for the company and how the company can implement more responsible and sustainable practices to reduce this risk. Sustainable water management contributes in achieving the Millennium Development Goals (Chapagain, 2006; Gleick, 2012).

Global trends when it comes to water are increased demand, decreased availability and declining water quality. However, it has been little awareness over the impact of climate change on water and the potential consequences for business. These trends affect companies and industries differently. The freshwater consumption in the world today has been more than doubled since the Second World War and is by 2030 expected to rise another 25 per cent. For companies and industries, this may mean that the cost for water will increase, regulations are implemented and conflicts are more likely to occur. Water scarcity may decrease availability for business activities; lead to increased cost, financial loss and impact on future growth. Declining water quality will increase the cost for pre-treatment and wastewater treatment, restrictions for some industrial activities and increased responsibility towards community and increased health costs for their employees (Morrison, Morikawa, Murphy, et al., 2009).

A critical driver of success in the 21st century economy will be how companies and investors balance the competing demands for water and energy. Companies should be prepared to provide details on the risk they face from water challenges and to be transparent about the energy trade-offs they make to address them.

Morrison, Morikawa, Murphy, et al. (2009:10)

Companies are expected by the international community to take responsibility for their impact on water resources. There are several strategies used by companies for improved corporate water management; operational and employee engagement, supply chain management, community engagement, policy engagement, partnership, and disclosure (Gleick, 2012;

Lambooy, 2011). Corporate water management is mainly driven by five motivations: (1) to achieve legal or social license to operate in a specific location; (2) to avoid operational crisis; (3) to attract investors; (4) maintain corporate values; and (5) to have a competitive advantage. To maintain production levels, long-term water management plans deal with water scarcity, water quality, climate change and other water-related concerns (Gleick, 2012). Morrison, Morikawa, Murphy, et al. (2009:28) have summarised the process of corporate water accounting in five steps:

- Measure the company's water footprint (i.e., water use and wastewater discharge) throughout its value chain.
- Assess the physical, regulatory and reputational risks associated with its water footprint, and seek to align findings with the company's energy and climate risk assessments.
- Engage key stakeholders (e.g., local communities, NGOs, government bodies, suppliers, employees) as a part of the water risk assessment, long-term planning and implementation activities.
- Integrate water issues into strategic business planning and governance.
- Disclose and communicate water performance and associated risks.

3.3 Corporate Social Responsibility

Corporate Social Responsibility (CSR) is an important part of business management. This section looks into how CSR is defined and how CSR should be linked to water use.

3.3.1 Definitions

Milton Friedman once said that "the social responsibility of business is to increase its profits" (Crane, Matten et al., 2014:27). Friedman was one of the CSR sceptics, and claimed that companies should think profit and not involve in governmental affairs. However, CSR is a management idea that especially has reached out to media and public interest since the economic crisis in 2008. "Most large companies, and even some smaller ones, now feature CSR-reports, managers, departments, or at least CSR-projects, and the subject is increasingly promoted as a core area of management, next to marketing, accounting, or finance" (Crane et al., 2014:4). However, the definition they use on their CSR can vary heavily. There are many different definitions of what CSR involves, the definitions differ in different industries and is also different from region to region. A study by Dahlsrud (2008) found that the challenge for companies is not to define CSR, but how CSR is socially constructed and how to implement the definition in a business strategy.

A common definition of CSR is that “the social responsibility of a business encompasses the economic, legal, ethical, and discretionary expectations that society has of organizations at a given point in time” (Carroll in Crane et al., 2014:5). The Norwegian Government operates with a fairly broad understanding of CSR:

The Government’s position is that CSR involves companies integrating social and environmental concerns into their day-to-day operations, as well as in their dealings with stakeholders. CSR means what companies do on a voluntary basis beyond complying with existing legislation and rules in the country in which they are operating.

Utenriksdepartementet (2009)

Companies increasingly see CSR as an integrated part of their business plan and as an opportunity to generate profit. The goal with a company’s CSR-strategy is to make its contribution to sustainable development as big as possible. A success factor for companies is to listen to the expectations of their customers, employees and the local communities they operate in (Crane et al., 2014; Standard Norge, 2010). Crane et al. (2014) identifies six core characteristic of the CSR concept as; voluntary; managing externalities; multiple stakeholder orientation; social and economic alignment; practices and values and; beyond philanthropy (see Figure 3-1). The CSR-definition used in this report is the one by ISO 26000 Social Responsibility:

The responsibility of an organization for the impacts of its decision and activities on society and the environment, through transparency and ethical behaviour that:

- Contribute to sustainable development, including health and welfare of society
- Takes into account the expectation of stakeholders
- Is in compliance with applicable law and consistent with international norms of behaviour
- Is integrated throughout the organization and practices in its relationship

Standard Norge (2010:4)

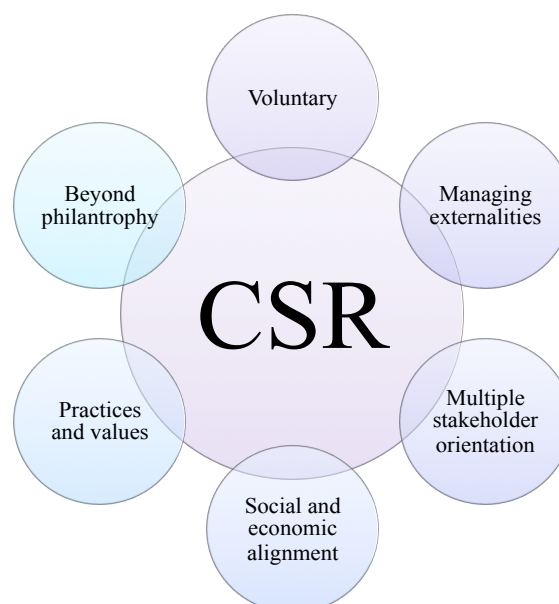


Figure 3-1: Core characteristics of CSR (Crane et al., 2014:9)

3.3.2 How to link CSR to water use

Stuart Hall was in the late 1990s, one of the first to write about the ecological issues met by business and society, and how ecological responsibility can be a part of a company's strategy. One of the reasons that CSR have received increased attention in the last decades is because of the growing awareness of the industries impact on ecological issues. Starting with pollution control, recycling, and waste minimization, more in-depth elements of sustainability are now taken into account, like climate change, resource scarcity and security (Crane et al., 2014).

John Ruggie provided a basis for what society can expect from companies when it comes to environmental responsibility. He was the one in lead for the UN Global Compact initiative, appointed by Kofi Annan. Ruggie “[...] distinguishes between a governments duty to protect its citizens against human right violations and the companies' responsibility to respect the human rights within their sphere of influence” (Lambooy, 2011:854).

Lambooy (2011) looks into if and how water use should be a part of a company's CSR-agenda. A majority of leading companies in water-intensive industries have weak water managements and weak disclosure on risk and opportunities related to water. It can be difficult to see the direct link between a company's water use and environmental changes. Resource security gets increasingly important in strategies, not only because of the global risks related to poverty and conflict but also in the companies own self-interest in order to ensure supply (ibid).

3.4 General CSR guidelines and initiatives

There are many guidelines and initiatives on CSR and environmental concern that involve water. This section briefly presents some of the main international initiatives for environmental CSR. Common for the most of these guidelines is that they are voluntarily initiatives with a low level of follow-up. However, it is possible to get external audit through independent certification in order to make their work on CSR visible for their stakeholders. Certifications can also be a good tool to identify strengths and weaknesses in a company (Lambooy, 2011; Utenriksdepartementet, 2013). Among transnational public regulations the UN initiative Global Compact plays an important role, while the still quite fresh ISO 26000 can potentially change the game among transnational private regulations (Crane et al., 2014).

Other initiatives from the UN Environment Programme (UNEP), the UN Food and Agriculture Organisation (FAO), the Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES) and the World Bank, are not included in this study. However, these and other initiatives that are concerned about environment and water can be relevant for in-depth information on climate and policies.

3.4.1 OECD Guidelines for Multinational Enterprises

The Guidelines for Multinational Enterprises by the Organisation for Economic Co-operation and Development (OECD) was first introduced in 1976 and have been reviewed five times since then. The Guidelines by OECD are a leading tool to promote responsible business in a global economy, and are one of the most used CSR-guidelines by companies' world over. The Guidelines provide voluntary principles for companies to adopt in areas such as employment and industrial relations, human rights, environment, information disclosure, combating bribery, consumer interests, science and technology, competition, and taxation. Chapter V of the Guidelines concerns the environment (Lambooy, 2011; OECD, 2014).

3.4.2 UN Global Compact

With the start up of the Millennium Development Goals in 2000, there was a need for a new entity to make business contribute to reach the MDGs. The United Nations Global Compact (UN GC) is an initiative that was established in 1999 by former UN secretary general Kofi Annan, and it is meant to encourage companies all over the world to adopt sustainable and socially responsible policies. The UN Global Compact is a vision that consists of ten principles the companies have to sign and adopt (found in Appendix II). The principles, which are based on the ILO declaration, cover human rights, labour standards, environment and anti-corruption. The tenth principle about anti-corruption was launched in 2004. The UN GC is purely voluntary and designed to support UN goals of sustainable development (Banerjee, 2008).

The three principles of the UN Global Compact that concerns the environment state that companies should address the key environmental challenges. Activities as research, innovation, cooperation, education and self-regulation are mentioned as positive activities to address the issues of environmental degradation and climate change. According to the UN Global Compact, companies should redefine their company policies to promote

environmental responsibility to include the triple bottom line of sustainable development; economic prosperity, environmental quality and social equity and develop reachable economic, environmental and social targets. This strategy should aim to take the organization beyond compliance in the long term and work for that their stakeholders also have an environmental friendly policy (UN Global Compact, 2014).

The UN Global Compact has been criticized for being ineffective and without any consequences for the companies that have signed but not changed their policies. Another critique is that the UN GC has not been showing any evidence of improvement several years after implementation. One reason for this is that the UN Global Compact is too weak and lack information on how the GC principles should be included in a company's operations (Banerjee, 2008; Sethi & Schepers, 2011). One problem with the UN Global Compact is that it does not take the role as a monitoring organization and that it has no regulatory role. Another issue is the independence and objectivity of the GC board, which is in a large degree dominated by the business members, and with no or little representation from the local networks (Sethi & Schepers, 2011).

3.4.3 ISO 26000 Social Responsibility

The International Organization for Standardization (ISO) is the world's largest developer of voluntary international standards. They have developed a comprehensive guideline to assist organisations in their implementation of CSR. ISO 26000 Social Responsibility was published in 2010, and the core subjects for organizational governance are human rights, labour practices, environment, fair operating practices, consumer issues, community involvement and development. The aim is to maximize an organizations contribution to sustainable development. ISO 26000 is a voluntary guideline about CSR that builds on international agreements and conventions developed by UN, UN organizations and ILO (Standard Norge, 2010; Utenriksdepartementet, 2013). The model in ISO 26000 for how an organisation can view CSR is presented in Figure 3-2.

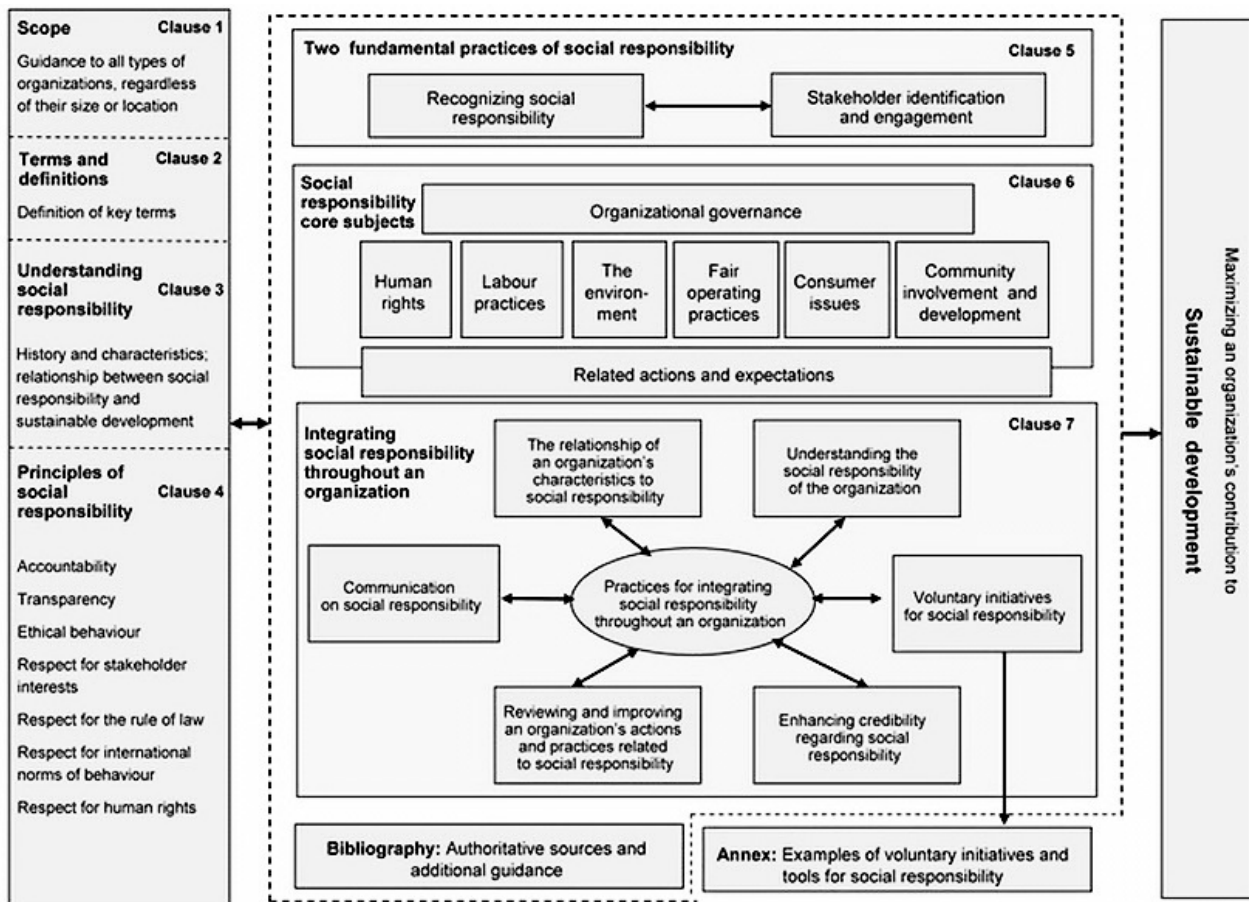


Figure 3-2: ISO 26000 Social Responsibility (Standard Norge, 2010:ix)

The ISO 26000 standard provides a guideline for helping businesses and organizations in both developing and developed countries to translate principles into effective actions and share best practices relating to social responsibility at a global level, assisting all types of organizations regardless of their activity, size or location. Unlike many of the other ISO standards, ISO 26000 was not created as a management certification standard. In other words, it cannot vouch for certified management practices. However, ISO 26000 presents several tools for ensuring that CSR activities also adhere to accountability in developing countries, and can therefore be valuable as a basic guideline for those interested in setting up projects that can make their money matter, in a sustainable way (Crane et al., 2014). Environmental responsibility is an important aspect of CSR and closely connected to other core values of CSR. Technical standards as the 14000-series help companies to systemise their work (Standard Norge, 2010).

3.4.4 Global Reporting Initiative

The Global Reporting Initiative (GRI) is a leading NGO that offers guidelines on environmental reporting and is one of the most used sustainability reporting frameworks for organisations. GRI provides principles and indicators that organisation can use to measure their economical, environmental and social performance. Companies are advised to report on their direct water withdrawal of all available resources and the direct impact on water sources. This is not mandatory reporting, and most companies do not take indirect water use into account, i.e. water used in the supply chain (Lambooy, 2011)

3.4.5 World Trade Organisation

Climate change affects international trade in different ways, through trade openness, rules and different bodies the World Trade Organisation (WTO) contributes to protection and preservation of the environment. The Doha Development Agenda of WTO is working on eliminating trade barriers on environmental goods and services, with the aim that this can promote development and trade in more sustainable goods. Such environmental goods and services can be catalytic converters, air filters or consultancy services on wastewater management (WTO, 2014).

3.4.6 Intergovernmental Panel on Climate Change

The Intergovernmental Panel on Climate Change (IPCC) bases their reports on published literature. IPCC indicate that climate change can lead to increased precipitation in the tropics and at high latitudes, and decrease in the sub-tropics. Ecosystems, human development and food security all over the globe will be affected by the future availability of freshwater resources (Udaya Sekhar et al., 2012). The IPCCs 5th assessment report will be completed in 2014 and provides updated scientific, technical and socio-economic information that is relevant to understand the risk and potential impacts of a human-induced climate change, and suggest options for adaptation and mitigation. The three working groups of the IPCC 5th assessment report have focused on the physical science basis of climate change, impacts, adaptation and vulnerability, and mitigation of climate change. The IPCC 5th assessment confirms and strengthens earlier predictions. The result shows that certain regions will see tremendous changes in climate, drier or wetter (IPCC, 2014a, 2014b).

3.4.7 Summary of general CSR guidelines and initiatives

The different guidelines and initiatives for CSR are summarised in Table 3-1. ISO 26000 Social Responsibility is still not well known, but considered as essential for companies and organisations. IPCC and other global institutions can provide relevant background information on region and sectors. GRI and OECD are leading CSR guidelines, however the UN Global Compact can despite critique serve as an inspiring platform for companies.

Table 3-1: General CSR guidelines and initiatives

Name	Guidelines for MNEs	Global Compact	ISO 26000 Social Responsibility	Global Reporting Initiative	WTO	IPCC
Institution	OECD	UN	ISO	GRI	WTO	IPCC
Purpose	Guidelines to promote responsible business in a global economy.	Encourage companies to adopt sustainable and socially responsible policies.	Guidelines for businesses and organizations in both developing and developed countries to translate principles into effective actions	Provides principles and indicators that organisation can use to measure their economical, environmental and social performance.	Protection and preservation of the environment. Eliminating trade barriers on environmental goods and services.	Scientific, technical and socio-economic information, to understand the risk and potential impacts of climate change.
Who	MNEs	Companies	Organisations and companies	Organisations and companies	Companies and governments	Companies, organisations and governments
How	Voluntary principles	Membership	Voluntary standard	Environmental reporting	Trade agreement	Information and suggestions

3.5 Corporate water management standards and tools

Water management is a key action to reduce the impact on the environment, with main focus on wastewater management and freshwater consumption. There are numerous water-risk tools available for companies. Some of the most used international standards and tool for corporate water management is presented in this section.

3.5.1 Global Water Footprint Standard

Many companies use the water footprint methodology by the Water Footprint Network (WFN) to identify the amount of blue, green and grey water in their products (Daniel & Sojamo, 2012). WFN published the Global Water Footprint Standard in February 2011 as a basis for formulation of sustainable water strategies and policies. By measuring the water

footprint of companies, it is possible to calculate the water risk for the business. The risk may be physical, reputational, regulatory or financial. Reducing water footprint should be a part of a company's environmental strategy, in the same way as reducing the carbon footprint. Traditionally have companies focused on the water use in their operations, while they with this standard need to focus on the whole supply chain, since the water footprint of their supply chain is much larger than their operational water footprint. Companies have two possibilities to reduce their total water footprint, either reduce its operational water footprint, or cut its supply chain water footprint (Aldaya et al., 2012).

3.5.2 ISO 14044 Life Cycle Assessment

ISO 14001 about environmental management is a well known and much used standard. The first step is to map the company's environmental management in order to discover the environmental impact and identify the actions for improvement. As a part of the analyses, an environmental policy is developed together with an improvement program with goals and deadlines. To achieve this goal the company has to implement an environmental management with routines for reports and distribution of responsibility (Utenriksdepartementet, 2013).

Life Cycle Assessment (LCA) is a part of the ISO 14000 environmental management series. LCA is both a standard and a method; LCA is a systems analysis tool that measures the environmental sustainability of a product or a service, and looks at all components of the value chain. Using LCA, companies or others can compare products and services up with each other on criteria as resource use, emissions, and impacts of these. LCA is now mandatory in the EU and Australia. A priority in recent years has been to develop better ways to account for water use, which traditionally not have been accounted for in the system analysis (Daniel & Sojamo, 2012; Gleick, 2012). The LCA and the water footprint methodology have some similarities in what kind of issues they identify. However, most companies don't use the LCA for water-risk accounting (Daniel & Sojamo, 2012).

3.5.3 ISO/DIS 14046.2 Water Footprint

ISO/DIS 14046.2 Environmental management - Water footprint - Principles, requirements and guidelines, is a new standard, expecting to be published by mid 2014. ISO 14046 is based on other ISO systems in the 14000-series. The new standard will specify the principles, requirements and guidelines of assessing and reporting water footprints of products, processes

and organization based on life cycle assessments. In addition to calculating and reporting the new ISO standard aim to share knowledge and best practice with industries and governments (ISO, 2013). In the new ISO standard the water footprint methodology is used as a part of the LCA, where the final outcome can include an impact indicator (Daniel & Sojamo, 2012).

3.5.4 Water sustainability Tool and Planner

The Global Environmental Management Initiative (GEMI) consists of corporations that are aiming to promote best practices in global environmental, health and safety. GEMI was established in 1990 and has members from more than 20 sectors (Morrison, Morikawa, Murphy, et al., 2009).

The Water Sustainability Tool by GEMI is an online tool that helps companies and organizations to create a water strategy, by identifying risks and address specific needs for action. The Water Sustainability Tool suggests five management stages that companies can follow in their development and implementation of a water strategy. Another tool developed by GEMI is the Water Sustainability Planner which aims to better understand the facility's dependence on water and the status of the local watershed in order to identify its specific challenges and opportunities (Gleick, 2012; *ibid*).

3.5.5 Global Water Tool

The Global Water Tool is an online tool offered by the World Business Council for Sustainable Development (WBCSD) that aims to couple corporate water use, discharge, and facility information input with watershed and country-level data. Companies do not have to be members of WBCSD, but can use the freely available online tool. The Global Water Tool helps companies in their risk analysis to locate water-stressed or water scarce regions. The Global Water Tool provides risk and performance indicators that companies can use to streamline the communication with internal and external stakeholders (Daniel & Sojamo, 2012; Gleick, 2012; Lambooy, 2011) To complement the Global Water Tool WBCSD has partnered with GEMI on a Local Water Tool (Daniel & Sojamo, 2012).

3.5.6 Summary of corporate water management standards and tools

The different corporate water management standards and tools are summarised in Table 3-2. ISO 14046 Water Footprint can be expected to be a leading standard within environmental management of water, since the ISO 14000-series on environmental management already is well known.

Table 3-2: Corporate water management standards and tools

Name	Global Water Footprint Standard	ISO 14044 Life Cycle Assessment	ISO 14046 Water Footprint	Water Sustainability Tool & Planner	Global Water Tool
Institution	WFN	ISO	ISO	GEMI	WBCSD
Purpose	Identifies the amount of blue, green and grey water in products for sustainable water strategies and policies.	Measures the environmental sustainability of a product or a service. Criteria as resource use, emissions, and impacts of these	Provides principles, requirements and guidelines of assessing and reporting water footprints.	Create water strategy, by identifying risk. Identifying local challenges and opportunities	Risk analysis to locate water-stressed regions. Risk and performance indicators.
Who	Companies	Companies	Companies and organisations	Companies	Companies
How	Standard. Water footprint methodology	Standard System analysis	Standard. Based on life cycle assessments	Online tool	Freely available online

3.6 Corporate water initiatives

Large multinational companies take the lead in interacting in initiatives to discuss and address business-related water issues (Daniel & Sojamo, 2012). The two leading initiatives, the CEO Water Mandate by the UN Global Compact and the World Economic Forum's Water Initiative is briefly presented here.

3.6.1 CEO Water Mandate

In addition to the ten principles, the UN Global Compact runs several sub-initiatives; an initiative for chief executive officers (CEOs), called the CEO Water Mandate is one of them. The public-private initiative CEO Water Mandate was launched in 2007 to address the emerging global water crisis. Companies are asked to make progress especially in the six priority areas; direct operations, supply chain, and watershed management, collective action, public policy, community management, and transparency (Lambooy, 2011). The CEO Water

Mandate is supposed to be a platform to collect and share experiences related to the six priority areas. The Mandate is for UN Global Compact members only, and has participants from diverse sectors and geographic location. Well-known water-intensive companies as Coca-Cola, Nestlé, PepsiCo, Royal Dutch Shell and Levi Strauss are some of the participants (Morrison, Morikawa, Murphy, et al., 2009). The sub-initiatives suffer from the same criticism that is given against the Global Compact. And especially that the stakeholders are showed little concern; “The Mandate has shown little concern for other stakeholders, notably the farmers and villagers whose water use would be constrained by the corporate users of local water” (Sethi & Schepers, 2011:42).

3.6.2 WEF Water Initiative

The World Economic Forum (WEF), in association with UNEP, launched the Water Initiative in 2003 to promote private-public partnerships on water projects and responsible management of watersheds. The aim is that a multi stakeholder network of companies, NGOs, international organisations and governments, will facilitate more cooperation on water issues. The focus of the initiative has been on creating water partnerships in India and South Africa. The WEF Water Initiative played an important role in the establishment of India’s first national public-private partnership on water, the Indian Business Alliance on Water (IBAW) (Lambooy, 2011; Morrison, Morikawa, Murphy, et al., 2009).

3.7 Summary of theoretical framework

The theoretical framework that will be used for analysis in this report will largely be based on ISO 26000 Social Responsibility (Figure 3-2) and the five steps for water accounting by Morrison, Morikawa, Murphy, et al. (2009) (Section 3.2.5). Water management is a lot about risk, both environmentally and economically. For a company it is important to map the environmental risks and see the impact on their activities on the local society. Further, it is important to acknowledge their responsibility and make an action plan and prioritise actions. A model that summarises the theoretical framework for how this can be done is presented in the Figure 3-3. To measure their water use, a water footprint assessment of products through ISO 14046 Water Footprint is a valuable tool to start with. Next phase is to assess the different types of water risk the company may face, physical, reputational and regulatory risk. When the companies know their water use and risks, they should take responsibility for the activities in their own influence zone. Background info and report on climate change and

impact of activities from IPCC, UNEP and other, together with CSR-guidelines from OECD, ISO and others are essential at this phase. There are different tools and initiatives available to integrate corporate water management, ISO 14046 is the newest among these. Companies could also join relevant water initiatives as the CEO Water Mandate or the WEF Water Initiative. Corporate water disclosure and external communication is the final phase.

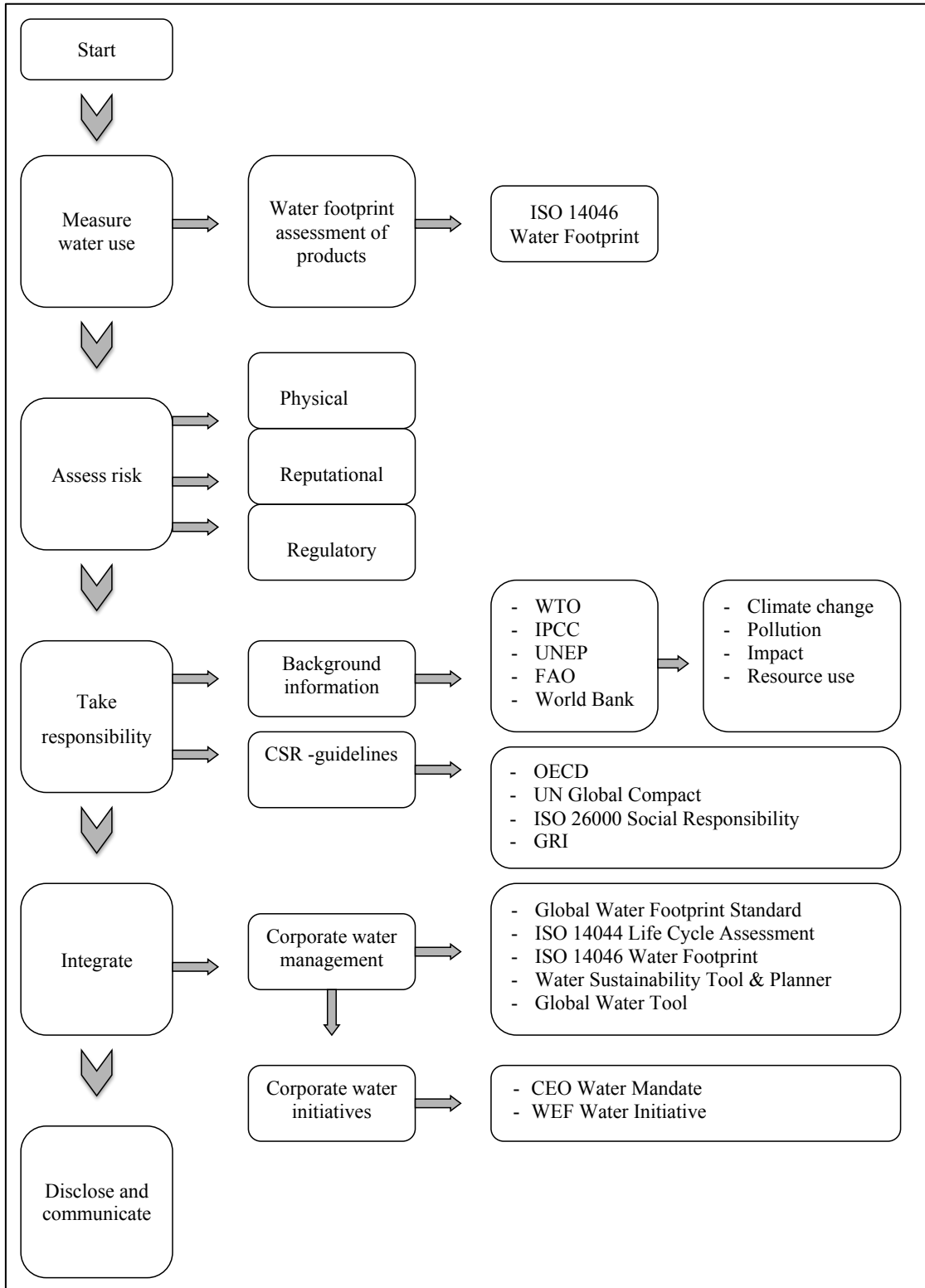


Figure 3-3: Summary of theoretical framework for sustainable water management

4 The water situation in India

This chapter presents the water situation, the water risk and the industrial water use in India. The last sections of this Chapter address CSR in India and give a brief presentation of four Norwegian water-intensive industries operating in India.

India, with its large and still growing population, has 18 per cent of the world's population but count for only 4 per cent of the usable water resources. In a huge country like India, there is a need for stable politics, control and measures that can contribute to sustainable development in the years to come. Several researchers predict a water crisis in the near future, last out is the last publication of the UN Water World Development Report, published in March 2014 (Mohan, 2014). Decreasing water availability may be a potential conflict between water users. To adapt to the impacts of climate change the Indian government has implemented several strategies to secure the country's food production. However, other pressing factors as population growth, market demand, poverty and climate change need more focus (Udaya Sekhar et al., 2012).

In some areas of New Delhi there is a lack of water, this has resulted in an increasing black market for water. According to government rules, access to water is a citizen's right, however, there is not enough water for everyone. The private water supply companies earn their money on drawing water from farmhouses outside Delhi to sell to posh neighbourhoods. The tanker mafia in New Delhi has succeeded because it have filled the vacuum created by the government's inability to provide an essential resource to its citizens (Manish, 2013).

Another issue that is likely to be a major issue for Indian politicians in the forthcoming years is the overuse of groundwater. Groundwater is the main water source for all uses, and stands for 85 per cent of India's drinking water. In fact, groundwater in the northern parts of India is declining at one of the fastest rates in the world. It is estimated by the World Bank that within 20 years India's groundwater resources will reach a critical state. If the government and business keep ignoring this water risk, it may have serious consequences, both for the industry, and the local environment and its inhabitants (Birkinshaw, 2014; Pearson, 2014).

4.1 Global water footprint scenario

The IPCC use a scenario analysis in their reports, an important tool that gives policy makers and managers the possibility to predict and analyse possible events in the future. Erchin and Hoekstra (2014) present a global water footprint scenario for 2050, inspired by the IPCC's scenarios. The analysis is a 2 x 2 matrix system, with two axes representing two key dimensions of uncertainty (Figure 4-1). Each of the four quadrants represents a scenario: global markets (S1), regional markets (S2), global sustainability (S3), and regional sustainability (S4). The scenario analysis goes further than previous studies as it address both blue and green water consumption, pollution is taken into account in the grey water footprint, and both agricultural and industrial consumption is included.

The global water footprint scenario shows how water footprints may develop in the forthcoming years. Factors that will affect water resources are; population growth, economic growth, changes in production and trade patterns, and increased competition because of increased demands. In their analysis, the impact of resource availability is only addressed implicitly (Erchin & Hoekstra, 2014). The tables and results of the scenario can be found in Appendix III. India is not a category of their own in these tables, but a part of the South Asia (named SAS), with Bangladesh, Bhutan, Maldives, Nepal, Pakistan and Sri Lanka.

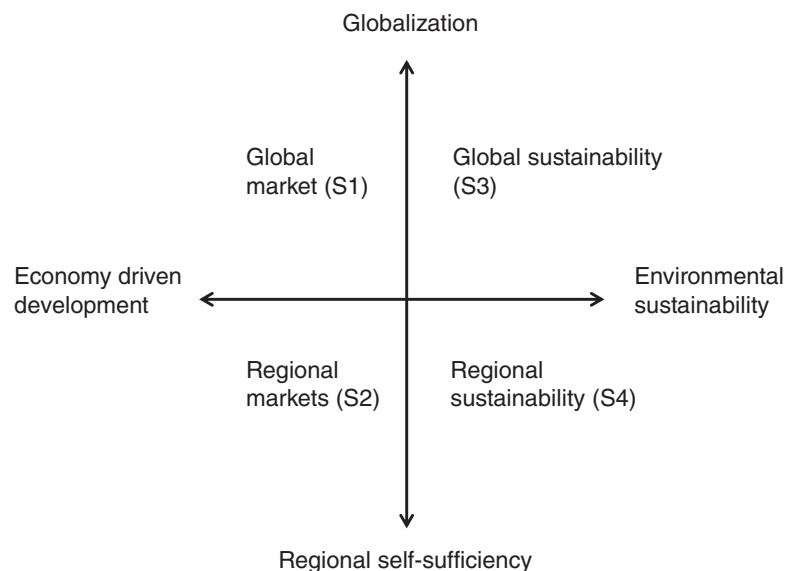


Figure 4-1: Four scenarios for global water footprint in 2050 (Erchin & Hoekstra, 2014:73)

The analysis by Erchin and Hoekstra (2014) shows that the water footprint is very sensitive to the drivers for change. Regional market (S2), where the main driver is high population growth

with increased meat and dairy consumption, has the highest water footprint of production and consumption. Global market (S1) is the scenario with the second largest water footprint. The study by Ercein and Hoekstra (2014) shows how the different drivers can affect the amount of global water consumption and pollution in 2050. The study also shows that it is possible to reduce the total water footprint. Of the four scenarios, Global sustainability (S3) is the scenario with the smallest total water footprint of production and consumption in all regions.

Scenario S3, global sustainability, resembles IPCC's B1 storyline. The scenario is characterized by increased social and environmental values, which are integrated in global trade rules. Economic growth is slower than in S1 and S2 and social equity is taken into consideration. Resource efficient and clean technologies are developed. As the focus is on environmental issues, meat and dairy product consumption is decreased. Trade becomes more global and liberalized. Reduced agro-chemical use and cleaner industrial activity is expected. Population growth is the same as for S1.

Ercein and Hoekstra (2014:73)

4.1.1 Water footprint and virtual water

Producing enough food for its growing population will be a huge challenge for India within few years, as India is considered to be a water scarce country by 2025. Data published by the Water Footprint Network (WFN) shows that in the period 1997-2001 the total water footprint of the Indian consumption was 987 billion m³/yr, which means 980 m³/yr per capita.

In India, the virtual water flows moves from water scarce to water rich regions and in that way the virtual water trade between Indian states is exacerbating scarcities in already water scarce states. This is shown in Figure 4-2, which shows the virtual water trade and per capita total water resources availability in Indian states in 2008. The red bars show each state's net virtual water import per year, while the blue bars show each state's total water resources per capita. The black line is the regression of the blue bars. The figure shows for example, that Punjab, a water scarce state, has high export of virtual water, while Bihar have high import of virtual water. Assam is a very water rich state with relatively low import of virtual water (Verma et al., 2009; Water Footprint Network, 2014b).

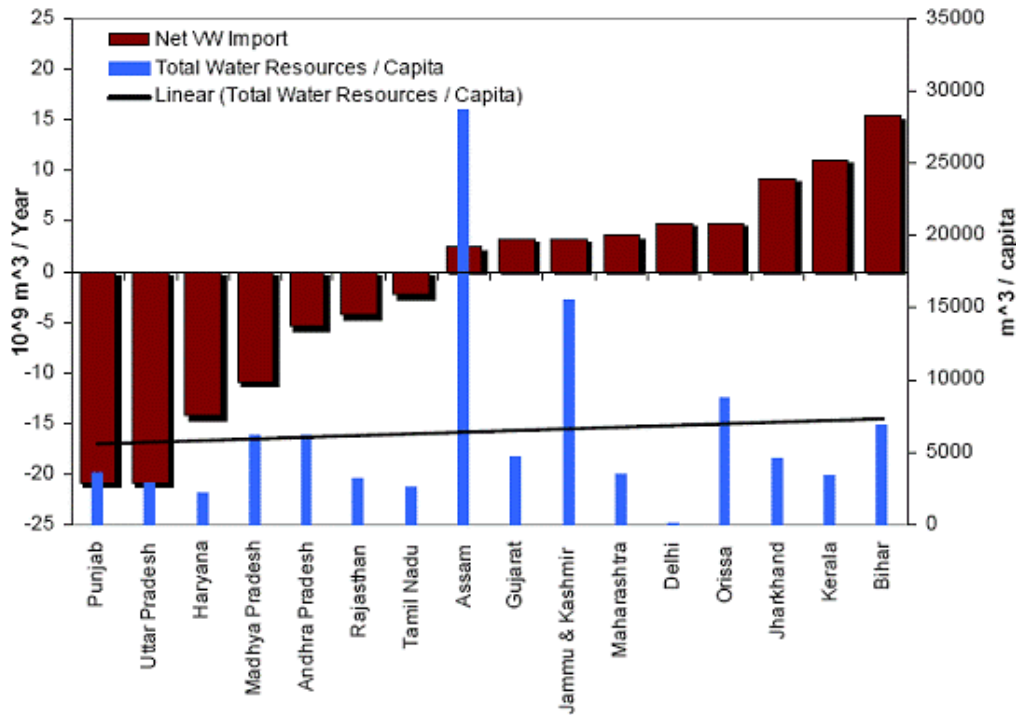


Figure 4-2: The virtual water trade and per capita total water resources availability in Indian states (Water Footprint Network, 2014b)

4.1.2 External water footprint

The total average water footprint of India is 1089 m³/yr per capita, of this only 2,5 per cent lies outside the country. In comparison the average water footprint of Norway is 1423 m³/yr per capita, were 68,2 per cent lies outside the country. On average, the global water footprint is 1385 m³/yr per capita. Globally, India has the largest blue water footprint, with 24 per cent of the global blue water footprint. The very low external water footprint shows that India, as of today, has a low dependency on other nations (Mekonnen & Hoekstra, 2011).

4.2 Water risk

The IPCC 5th assessment report shows that there is a wide range of possible side effects of climate change that have not been good enough quantified for. Whether or not these side effects materialise and to what extent will be region specific, depending on local circumstances and implementation. Water availability is one example of a resource that will vary more if the predictions by the 5th assessment is correct (IPCC, 2014a).

4.2.1 The water risk for India

Today, India has a low water dependency on other nations, however, this can change in the near future. The exploding population growth since the 1950s, together with high economic growth since the 1970s has put India's natural environment under pressure. Today urbanization, unsustainable use of land and water, poor infrastructure and economic growth are threatening the natural resources. The use of groundwater has increased the last decades, as a result of increased water demand and dry river basins. Indian and Norwegian scientists have found that rivers in South India are in danger for water shortage as a direct result of climate change. Though the river basins have experienced an increase in rainfall, it varies in quantity and intensity, which results in floods and droughts. The capacity of dams and hydroelectric power stations is also lower because of clogging due to an increase in soil sediments (Udaya Sekhar et al., 2012).

The demand for water will continue to expand towards 2050, the increase of Asia alone is predicted to be 65 per cent in industrial water use between 2000 and 2030 (WWAP, 2014). The World Resources Institute (WRI) produces global water risk maps; the overall water risk for India is shown in Figure 4-3. The water risk map for India shows that large parts of the country have a high to extremely high water risk, especially in the southeast and in the northern part. The Himalayan glaciers at the Tibetan plateau that today serve India and nearby nations with water, are expected to retreat as a direct effect of climate change and global warming. Other effects as change in rainfall patterns and more extreme weather will also affect the water security in India. Climate change combined with increased demand for water resource are the main reasons for the fact that water scarcity is expected to become a major problem in India, and the country is predicted to be a water scarce nation by 2020. Today, nearly 50 per cent of Indian villages do not have access to safe drinking water (CDP, 2013; Morrison, Morikawa, Murphy, et al., 2009; Udaya Sekhar et al., 2012).

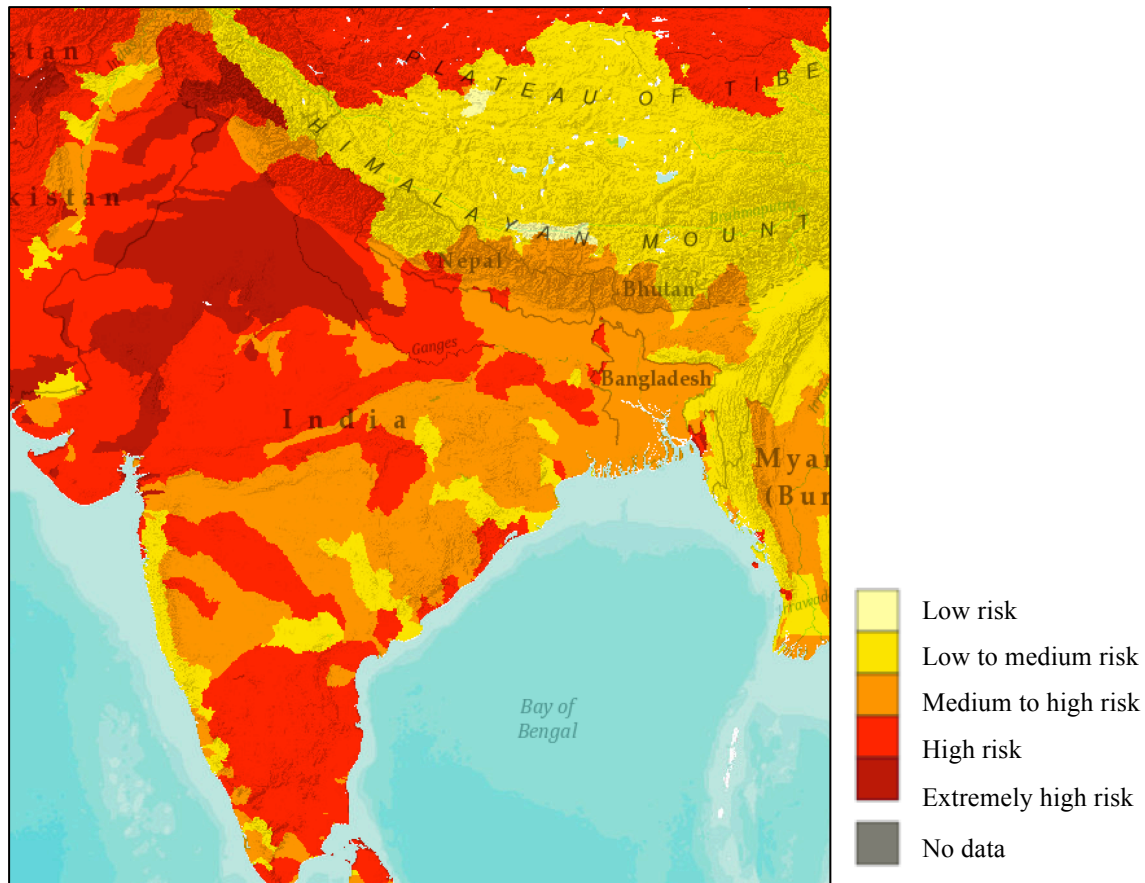


Figure 4-3: Overall water risk in India (WRI, 2014)

4.2.2 Water risk for companies

The Indian government has recognised water as a global risk, and in the nation's 12th Five Year Plan, the focus is on the need for a change in the management of India's water resources. In addition, companies are recognising that declining water availability and quality will increase the competition in the future, and that "no water means no business" (CDP, 2013:8). A survey of 29 Indian companies from different industries found that 55 per cent considered themselves exposed to water-related risks that could affect their business operation (ibid). Types of water-related risks reported by the Indian companies are presented in Figure 4-4. Another study found that 60 per cent of the survey respondents believed that the availability of water impacted their business today, while 87 per cent of the companies believed that limitations in water will affect their activities within the next decade (Perveen, Sen et al., 2012).

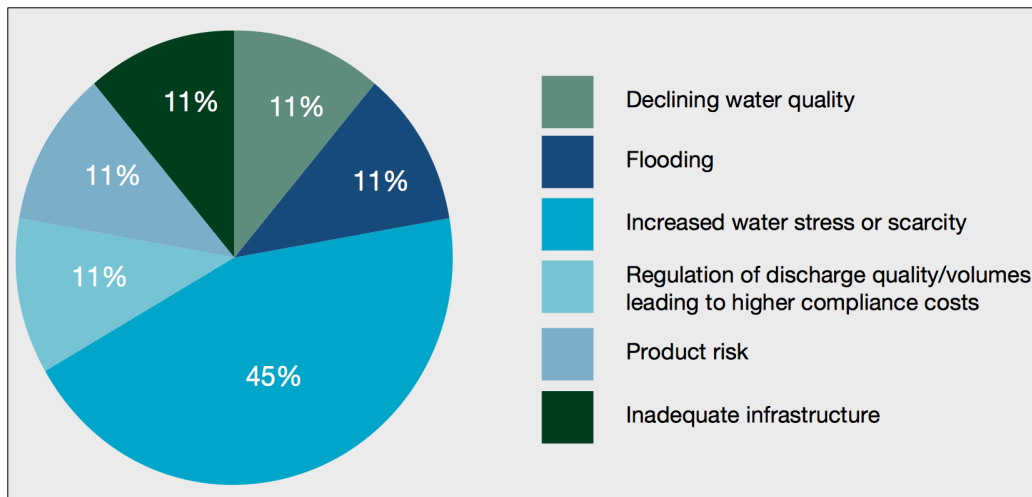


Figure 4-4: Per cent of water-related risks reported by Indian companies (CDP, 2013:19)

4.3 Industrial water use

The Indian industry will have a rising demand for water resources in the coming years. Today 80 per cent of the available water resources are used for agriculture, and less than 10 per cent are used by the industries. In recent years, there have been an increasing awareness over which substantial threats water use can pose for business and industries in certain regions and sectors (Perveen et al., 2012).

4.3.1 The key water issues

The key water issues for the Indian industry, summarised by Rana (2013) are presented below:

- Industrial water consumption is expected to quadruple between 2000 and 2050. By 2050 industrial water consumption will reach 18% of total annual water consumption, up from just 6% in 2000
- Industrial wastewater discharge causes pollution and reduces available freshwater reserves
- There is no regulatory binding on water usage and wastage
- Around 6.2 billion litres of untreated industrial wastewater is generated every day
- Thermal power and steel plants are the major contributors to annual industrial wastewater discharge
- By 2050, groundwater level in the Ganges basin (which provides water to UP) is projected to deplete by 50-75%
- By 2050, groundwater levels in the Krishna, Kaveri and Godavari basins (which provide water to Maharashtra, Tamil Nadu, Karnataka and AP) are projected to deplete by 50%.

4.3.2 Indian water framework

The Indian industry is the second highest user of water after agriculture, although, a challenge is that there is a lack of quantitative data and reports that can measure the actual impact of industrial water use, and that connects the impact on agricultural growth (Perveen et al., 2012).

In the 12th Five Year Plan, the Planning Commission focus of issues as major and minor irrigation projects, the groundwater situation, urban water and wastewater management and flood management. It is also recognised that there is a need for a change in how national resources are managed. Development of a water database that will provide comprehensive, reliable data on physical facilities, methodologies and mechanism is in progress. This new institutional framework for water will create a guide for water resources development in India. The process of revision of the National Water Policy is also in progress, however, there is a need for a national water law. A national water framework law is drafted, with a statement of general principles on water as a vital and stressed resource. The new law will provide a broad national legal framework, including all water-use and actions related to water, nevertheless, it will take time before the law is implemented (Planning Commission India, 2011, 2013).

The Indian government is putting a stronger pressure on the industry to adapt international practices of water management, and has proposed a three-step process toward water sustainability. Step one is to include water audits in their activity in order to understand the water use in the industrial sector. Step two is to incentivise water conservation and examine actions to levy charges for water use, and the final step three is to publish validate water audit of industries to share experience and identify best practices (CDP, 2013).

4.3.3 India Water Tool

The India Water Tool (IWT) is a country version of the WBCSD Global Water Tool, developed by a working group of 14 companies based in India.

The companies pooled their expertise to obtain the best available data on ground water availability and quality in India and customize the tool to their country context. The tool will help companies respond to the growing challenges of managing water effectively in this large, water scarce country.

WBCSD (2014)

India Water Tool consists of two parts, a workbook companies can download to compare own data against available background data, and an online mapping system that maps the groundwater availability and quality around the company site. IWT is for companies with direct operations or suppliers in India to discover the high priority sites for water management and analysis. Results generated from the India Water Tool can be used in communication externally and internally, to carry out individual assessments at high-risk sites, and to develop a strong water management strategy. IWT is supposed to help and encourage companies to get a deeper understanding of the water situation in the local communities they are operating in (WBCSD, 2014).

4.4 CSR in India

Corporate social responsibility in larger companies operating in developing countries has received increased focus in the last decades. CSR in India has traditionally been linked to philanthropy and donations. A study of 536 companies in India found that philanthropy is viewed as the most significant driver for CSR, followed by image building, employee morale and ethics. The same study also found that the number of companies developing and adopting CSR policies have increased since similar studies in 2000 (Khanna & Gupta, 2011). Early 2014 a new law about CSR was implemented in India, with the Companies Act larger companies have to spend 2 % of their average turnover in the three previous years on CSR. The biggest challenge with the new law is that there is actually no penalty spelt out for not spending the mandated 2%, but some are optimistic about the law and hope that it in the long run it will bring a more strategic approach to CSR by the Indian corporate sector (Neelakantan, 2013).

4.4.1 Drivers and enablers for corporate sustainability

The Federation of Indian Chambers of Commerce and Industry (FICCI) identify the global drivers for corporate sustainability as regulations, access to capital, expanded consumer base, social license to operate, innovation, brand and reputation, and operational efficiency. Enablers for corporate sustainability in India are vision and strategy, governance structure, and monitoring and reporting. Regulations in India have changed significantly the last years, from self-regulation and employee voluntarism in the 1990s, to new business models based on innovation and sustainability. Section 135 of the revised Companies Act of 2013 makes it

mandatory to spend at least 2 per cent of the annual profit on CSR activities and annually report on these activities (FICCI, 2014).

In India, it is established that impacts of climate change will increase the demand for water, and the Indian government is considering a couple of water-related regulations. It is expected that when these regulations are approved and implemented, companies will have to implement measures to secure their water supplies (ibid).

The Indian scenario, filled with regulatory and voluntary activity is moving towards responsible corporate behaviours and consumerism. It is not before long that companies operating in India will be setting benchmarks for global sustainability behaviour. Every company that tags along in this journey will have an impact to make and an idea to drive.

FICCI (2014:12)

4.4.2 Involvement from companies in water-related issues

Multinational corporations (MNCs) involvement in water-related industries increasingly get more attention. The case of the Coca-Cola company in the southern state Kerala is a well-known example of this kind of involvement, and can serve as base for the discussion about sustainable water management in India.

Liberation reforms and the opening of the Indian economy in the 1980s and 1990s, gave the Coca-Cola company, PepsiCo and other water giants access to the growing water market. Increased demand from an expanding middle class and privatization in the 1990s led to a fast growing bottled water industry. The Coca-Cola Company and PepsiCo together have control of 80 per cent of the soft drink market, and 40 per cent of the bottled water market. The cost of extracting water in India is very low and combined with low labour cost, this are the reasons for why the bottled water market has become highly lucrative (Aiyer, 2007). However, the majority of Indian live in rural India, called the “India of the 88 per cent”, that has not been part of the economic development the last decades, but instead has faced serious agricultural crisis. The Indian agriculture “now only contributes 25 per cent to the national GDP even as 75 per cent of the population is dependent on it” (ibid:650).

The problem raised for the Coca-Cola company in 2003 when they were accused of extracting the local community’s groundwater, causing water shortages and thousands farmers without water. In addition to this, the Coca-Cola company was accused for polluting drinking water and soil. In the Indian state Kerala it went so far that Coca-Cola’s licences to operate were not

renewed. After this scandal the Coca-Cola company has reduced their use of groundwater, with the goal to be a “net-zero user of groundwater” in India, and is also one of the partners of the CEO Water Mandate (Lambooy, 2011).

4.4.3 Environmental CSR among Norwegian companies in India

Norwegian companies’ strategies on environmental issues when operating abroad have not received much attention. The information published is insufficient and the author has found that there is little knowledge about how pressing climate changes will affect Norwegian companies abroad. Therefore, the results from the research project among Norwegian companies’ experiences and attitudes to CSR in India are relevant here.

The general results from interviews with 13 Norwegian companies in India showed that environmental awareness is increasingly becoming an important part of the CSR-strategies. The companies in the sample were asked on how or if environmental concerns were implemented in their CSR-policies. Some of the companies have what can be called a green strategy; with the motivation that being responsible today can save or prevent them for concerns in the future. These green strategies spans from smaller initiatives as posters and guideline about power saving and paper reducing to more environmental friendly production.

The use of ISO standards and certifications seems to be more important than voluntarily initiatives as the UN Global Compact and CSR standards as ISO 26000. The research found that some of the companies do have a clear strategy on environment, but that this is a lot about image since their strategies do not go much deeper than having guidelines on saving energy and paper at the office. Several of the companies in the sample are consultancy or sales companies, with little focus on the environment. The companies with production in India have a stronger focus on environment issues since there are strict laws and regulations both from the Indian side and from the Norwegian parent company. There is also a requirement through Indian law that especially new production facilities have to be certified as environmental friendly. Clean energy sources in production, rainwater harvest for use of water in production and waste management and recycling are some of the initiatives that are used (Harildstad, 2013).

The findings from the Norwegian companies' environmental strategies are similar to other studies from Indian companies. Kansal and Singh (2012) found that global issues as water, energy, and safety not receive adequate attention. Indian companies instead focus on employee training programs and sponsor health projects for the local community. A survey of 29 Indian companies showed that the focus on water management is diverse, as the response varied from comprehensive information about the whole value chain to basis focus on direct operations. The study found that even though there is an increasingly awareness of water-related risks, the concrete plans and action to manage this issues are inadequate (CDP, 2013).

4.5 Norwegian companies in India

Norwegian companies are located all over India, but most companies are established near the main industrial clusters of Mumbai, Chennai and Bangalore. Four companies with water-intensive production in India were selected for further discussion in this study, these companies represent different industries; paint, food, energy and apparel. The four companies presented have production in different regions. Jotun has their production in the southwest, MTR Foods in the southeast, SN Power in the north, and Varner are connected to factories in both water-rich and water-poor states (Innovation Norway, 2013b). In this section, each company is briefly presented, with the essence from what was said about CSR and environment in the interviews and email-contact.

4.5.1 Jotun India Pvt. Ltd.

Jotun is a paint-coatings and powder-coatings company with a 100 per cent ownership by the Jotun Group. Jotun has been in India since 1992 as a trading office and has since 2008 manufactured in India. The Jotun Group uses corporate responsibility, CR, instead of CSR. Their policy comes from headquarter in Norway and is the same for all locations. However, the managers need to understand local laws as well, and each plant has local guidelines in addition. Their guidelines are built on the UN Global Compact and they report regionally. Jotun India has had a CR-team since the start up in India and the CR-team is a part of the Middle East region. Jotun has six stakeholders that they consider to be important; employees, society, suppliers, environment, shareholders, and customers. According to the CR-team in India there it a general understanding not just in India, that CSR is about charity and sponsoring of projects.

When it comes to environmental CSR, the Jotun Group follows the norms with respect to pollution and environment, Jotun India is certified for ISO 9001 and ISO 14000. The plant is not using raw materials that harm the environment, has recycling policies and zero waste generation. The production facilities use water limited to their own production. The Indian industries are not allowed to take groundwater by their own, every industrial zone has been provided with water supply through water reservoirs. State regulatory bodies control the water use in the industries, Jotun is not allowed to use more water than specified in consent given by governmental authority, and monthly reports on their water use needs to be submitted. Every industry has to provide treatment plant to treat wastewater. In addition, they have to provide action plans on the recycling of wastewater generated through sewage treatment plant, like reusing for gardening purposes. Jotun is not allowed to discharge any wastewater outside exceeding discharged parameters set by the pollution control board of India. All parameters have to be checked for every discharge and a report needs to be submitted to authority yearly.

4.5.2 MTR Foods (Orkla ASA)

MTR Foods is originally an Indian company, established in 1924, and has since 2007 been a 100 per cent subsidiary owned by Orkla. MTR Foods manufactures processed packed food; spices and masala, breakfast-, sweet- and snacks mixes, and ready-to-eat products. Their focus is on offering the Indian market natural and healthy products that are easy for everyone to prepare. About 80 per cent of their products are sold to the three Indian states; Uttar Pradesh, Karnataka and Tamil Nadu. MTR Foods also exports to international markets where there are ethnic-Indian populations, with the US as the largest export market.

According to MTR Foods, there is still a lot of work that has to be done when it comes to CSR in India. The informant emphasises that it is important to keep the S in CSR in India, since it is still important to build infrastructure, and support education and health programmes. In MTR Foods, there has been a stronger focus on CSR since spring 2013, with education, health care and environment as the core focus areas. With the new owner Orkla, the company has been through some changes and now consider themselves as a more professional driven company. The owner company Orkla's policies are based on the UN Global Compact. The CSR team in MTR Foods have made the CSR-strategy with help from Orkla. Their own CSR-policy is made in line with Orkla's code of conduct, were the

challenge has been to change it into local context. The environmental policy states that MTR Foods shall have zero pollution emission, recycle and have proper waste segregation. They have already invested in rainwater harvest, since the production requires a lot of water. New facilities have to be environmental friendly and on the production sites, they have started using clean energy sources, like solar power.

4.5.3 SN Power India Pvt. Ltd.

SN Power is a hydropower company owned 60 per cent by Statkraft and 40 per cent by Norfund. SN Power has been exploring possibilities in India since the end of 1990s, and had the first purchase in 2004 with 49 per cent ownership in a hydropower plant in the northern state Himachal Pradesh. As the only foreign investor in the hydropower sector, they now have ownership in two plants and have a licence on new plant with their new partner, TATA Power.

The head of CSR is located at headquarter in Oslo, and since CSR is an important part of their projects, SN Power spends a lot of time on CSR. Their guidelines and agreements on what they are allowed to do cover almost everything. In governmental contracts, it is stated that a certain per cent from the project budget has to be used on CSR when they receive a licence. Sometimes it is decided by the state what kind of activities that have to be funded. Activities can be to develop the local society with schools and hospitals. The informant mentions that a motivation for the job is to see the result of the local development, to turn an undeveloped place into a functioning society. To succeed in this process the local society has to be involved.

SN Power has experienced that it has paid off to use a “Norwegian attitude” of what is right and wrong. Reputation and risk is very important, both in CSR and HSE. SN Power is a state-owned company and everything has to be done correctly in order to survive, since the commercial help would disappear if something goes wrong. SN Power has the same kind of guidelines on activities in all the countries they operate in, and a project from the Philippines is used at the Harvard University as a case on how to involve the local communities. However, there are challenges in all countries. In India, it is especially important to involve and talk to the local chiefs, as some always try to get more money out of the project. The construction of the hydro plants involves a changing of the patterns for the local society.

Tribes want to use the same route as they always have done, in their agriculture and the crossing point of rivers.

SN Power has big ambitions in India and a competitive advantage in that their focus is on improving local societies, and to contribute with green energy, which is needed in India. SN Power is more expensive than other companies in India, because they calculate risk, plan and invest more in proper machinery. SN Power differentiates from the other companies in this study, since the environmental agenda lies in their business plan; it is a green company with a business idea that is renewable and sustainable. To save energy, they try to use a smaller hydro plant when they construct. There are also controversies with their activities, as with construction of dams. However, in India the new plants are so remote that this is not an issue. A huge part of planning new projects is a CSR evaluation on land acquisition and calculating how many people that will be affected. SN Power aims to be the best, and is member of several international initiatives, including the UN Global Compact.

4.5.4 Varner Group

The Varner Group is Norway's largest clothes retailer, represented in nine countries through 12 different clothing chains. The largest markets outside of Norway are Sweden and Finland. The Varner Group is connected to factories in over 15 countries. In India, they use different suppliers located in all regions. Varner has had an office in India since 2011 and has recently opened an office in Bangladesh. The Varner Group has had focus on CSR since the early 2000. The CSR headquarter is located in Norway, while the CSR responsible for the whole South Asian region; Pakistan, India, Sri Lanka, and Bangladesh, is based in New Delhi.

The Varner Groups focus on environmental issues comes from their headquarter in Norway, and is also an important part of their code of conduct. Varner's policies on environment focus on water and energy management systems, among others. The value chain also has to put environmental issues on the agenda and work for improvements. The factories should have a program for reducing its own emissions and optimize resource usage. Much water is used in the textile industry and it is therefore important that the factories have a treatment plant so that water can be reused. Through inspections, visits and regular dialogue, the Varner Group control that their factories have good practices to avoid environmental- and chemical-infringement. Varner has an extensive chemical program and impose strict chemical

requirements for manufacturers that are followed up via internal testing within the clothing chains.

The Varner Group is not a part of the UN Global Compact. When it comes to special initiatives on environment in India, the Varner Group is cooperating with the Danish Håndværksrådet (Hand Glass Works Council) regarding a pilot project funded by the Nordic Council of Ministers. This is not an official project yet as it is in the early stages and still under review. The overarching goal with this project is among others to develop the ability to implement environmental labelling schemes (including the Swan label) at suppliers in Tirupur, Tamil Nadu.

4.6 Summary of case

India is predicted to be water stressed within few years as a result of increased water demand and direct effects of climate change. With its large and growing population, there is a need for stricter policies and regulations on water use. A global water footprint scenario by Ercein and Hoekstra (2014) found that it is possible to reduce the total water footprint, even with an increasing population. For this to happen other drivers, such as consumption patterns, have to change. The water risk will also affect industries, the Indian government is pushing for adaption of international practices in water management and a new National Water Policy is in progress (CDP, 2013; Planning Commission India, 2013).

CSR in India has traditionally been linked to philanthropy, however, increased focus on companies role in sustainable development and new regulations are changing the role of CSR in India. Certifications seem to be better known than voluntarily initiatives as the UN Global Compact. There is little information on Norwegian companies environmental concern when operation abroad. Findings from interviews with Norwegian companies in India found that the Norwegian parent company's environmental policies are adopted, but that this is not always a part of a CSR strategy. Norwegian companies face several challenges in India that can make environmental CSR more difficult to achieve. Complicated law and regulations that are difficult to fulfil, can lead to corruption. Norwegian companies are known to be clean when it comes to corruption, however, companies must constantly assess and set high standards for their suppliers and stakeholders (Harildstad, 2013).

5 Analysis

This Chapter analyses the different types of water-related business risk Norwegian companies face in India and what kinds of risks the four water-intensive industries presented in Chapter 4 faces. In the end of this Chapter, the water initiatives that can be relevant for Norwegian companies in India are presented.

5.1 Business risk

In their risk framework Morrison, Morikawa, Murphy, et al. (2009) distinguish between three types of business risk: physical, reputational and regulatory risk. Each of these risks can lead to increased cost and a financial risk. All of these water-related business risks can be relevant for India. The three types of water-related business risk Norwegian companies face in India are summarised in Table 5-1.

5.1.1 Physical risk

The physical water risk is related to water quantity and water quality, and physical risk may mean that a company does not have enough good quality water for their business activities. The physical risk for companies operating in India can affect operations where water is needed for production. Decline or disruption in water supply may have an impact on the supply chain and the access to raw materials. Traditionally, estimates of water use fail to address the water risk in supply chains. Local water scarcity can also have an impact on business activities, as the cost and availability of water affects the customers' interest and ability to buy or use water-intensive products and services. Water scarce regions generally faces decreasing water quality, which increases the cost for water pre-treatment (CEO Water Mandate, 2014; Morrison, Morikawa, Murphy, et al., 2009).

5.1.2 Reputational risk

The physical risk can lead to a reputational risk for the companies. The reputational risk influences a company's brand and image and can influence customers. A decline in availability and quality can lead to increased competition of water resources. Tensions may

rise between the company and the local society, especially in water scarce regions in developing countries. The case of Coca-Cola in Kerala, India is an example of a company that suffered from a reputational risk after losing their license to use groundwater. The reputational risk increases, as today's consumers are more aware of water issues and people's right to access safe water. With increased competition with local society, water-intensive industries face reputational risk and damage in water scarce regions. Public perceptions can spread fast in a globalised information economy and affect business decisions (CEO Water Mandate, 2014; Morrison, Morikawa, Murphy, et al., 2009)

5.1.3 Regulatory risk

Water scarcity and reputational pressures can result in a strengthening of water policies. Regulatory risks can be restrictions by the government on water use and wastewater. The regulatory risk increases as local societies put pressure on local government about stricter requirements on for instance water pollution. A result can be stricter and more costly requirements on companies' wastewater discharge, water quality standards, licenses to operate and infrastructure development. Some water-intensive industries face reputational and regulatory risks associated with their grey water footprint, created by large volume of wastewater discharge and the risk for spill into freshwater resources. The increased focus on environmental issues all around world increases both the reputational and the regulatory risk (CEO Water Mandate, 2014; Morrison, Morikawa, Murphy, et al., 2009).

5.1.4 Summary of water-related business risk in India

The different types of water-related business risk companies face in India is summarised in Table 5-1. The table presents the reason for risk, the impact for the company, and the outcome of the risk.

Table 5-1: Types of water-related business risk in India

Type of risk	Reason for risk	Impact	Outcome of risk
Physical	Scarcity	Increased competition	Increased water prices
	Disruption	Supply chain	Increased prices on products and services
	Flooding	Raw materials	Less consumers
	Pollution	Business activities	
	Quality		
Reputational	Availability	Tensions between local society and company	Exclusion
	Quality		Less consumers
	Degradation of water resources	Brand and image	Damaged image
	Local society	Consumers purchasing decision	
	Environmental awareness		
Regulatory	Scarcity	Water use	Restrictions by government
	Reputation	Pressure by local society	Stricter water policies
	Pollution	Pressure by international community	Wastewater regulations
	Local society		Increased cost for wastewater treatment
	Environmental awareness		

Source: CEO Water Mandate (2014); Morrison, Morikawa, Murphy, et al. (2009)

5.2 Key risks for different industries

Water scarcity is a problem in many parts of the world, and there is an increasing pressure on water-intensive industries, both regulatory and reputational. Several developed countries have implemented legislations to reduce water consumption. California has since 2007 required that all toilets sold within the state have reduced water consumption to a maximum of 6 litres per flush (Morrison, Morikawa, Murphy, et al., 2009).

In India the industrial sector accounts for a smaller amount of the available water resources directly, however, their supply chain is exposed to larger degree of water risk, causing an indirect risk for the company (Perveen et al., 2012). Factors that can affect a company's water risk are location, water quality, water supply and climate change. A large water footprint in one segment of the value chain causes an increased overall risk. Control over the value chain can be the main challenge to avoid water risk (Morrison, Morikawa, Murphy, et al., 2009).

Water-intensive industries face different water risks, and the risk framework can be used to evaluate the water footprints on different industries. This section describes the key water risk for the sectors presented in Chapter 4: paint, food, energy and apparel. Companies should in their water management and CSR-strategies consider these key risks. The key risks for the different industries are summarised in Table 5-2.

5.2.1 Paint

Production of paint demands huge amount of water and use chemicals that can pose a risk for the local society if discharged. Water scarcity can be a physical risk for the industry as there is a huge demand for water in production. To avoid a reputational risk it is important to avoid pollution and degradation of water quality. The industry relies on governmental consents on water use. Industries are not allowed to use groundwater on their own, every industrial zone is provided with water supply through water reservoirs. Physical and reputational water risk in the region can lead to a regulatory risk for the industry (Morrison, Morikawa, Murphy, et al., 2009).

5.2.2 Food

Water resources are fundamental for the food industry. Globally, about 70 per cent of the freshwater resources are used for agriculture, 90 per cent of this share is used for agriculture in developing countries. The most important physical water-related risk is in the production of raw materials, in crop or livestock production. The impact of climate change on precipitation patterns and the frequency of drought and flooding may affect quality and demand. Increased temperatures and dry weather raise the water demand for crop and livestock. Modern agricultural practices have large impact on the water quality and can cause a risk for 'dead zones' because of heavy use of fertiliser with nitrogen and phosphorus. The World Resources Institute (WRI) has found 415 dead zones all over the world (Morrison, Morikawa, Murphy, et al., 2009).

A company's reputations and image can be damaged by tensions with local communities about the company's operations impact on local water sources. Meat has huge water and carbon footprints. The increasing demand for more food and a change in diet towards more red meat in large developing countries as China and India, will cause increased pressure on water resources in the future. On the other hand can the increased recognition among consumers that meat is a water-intensive product may have an affect on the demand for meat products. With increased temperatures, there is a higher risk of contamination in food and fruits, this can cause both a reputational and a financial risk for the company. A regulatory risk is the availability of water and increased competition that can affect the food prices. A result can be implementation of stricter regulations on wastewater quality in food and meat processing facilities (Morrison, Morikawa, Murphy, et al., 2009).

5.2.3 Energy

Hydropower projects are very sensitive to climate change. The energy industry requires a consistent water supply, and water scarcity may have a significant impact on operations. Hydropower plants face an increased water risk as climate change causes decrease or changes in water flows. Increased water use in the upstream water use, such as human consumption, agriculture and industry, may also affect a project. Another impact of climate change and increased temperatures can be a change in the demand for electricity.

Both people and ecosystems can be affected by the energy industry's activities. Construction of large dams change the natural ecosystem, and can result in drought in earlier water-rich areas. Construction of dams suffers from a reputational risk as several environmentalists claim that dams will affect river ecosystems and cause risks to both up- and downstream biodiversity. Reputational and regulatory risk for hydropower plants can be tensions with local communities. This has especially been the case in huge dam projects where whole villages are moved to make space for a dam. Changing of local biodiversity and displacement of people can cause regulatory risk for the energy industry, it is therefore crucial that the company works together with the local communities on solutions (Morrison, Morikawa, Murphy, et al., 2009).

5.2.4 Apparel

For the apparel sector cotton production is the segment in the value chain that require most water and is most vulnerable to physical water risk (Morrison, Morikawa, Murphy, et al., 2009). Cotton production has large impact on local water resources, since cotton production requires huge amounts of water. In fact, "cotton consumption is responsible for 2.6 per cent of the global water use" (Chapagain, 2006:119). To produce the 250 grams cotton that is needed for the average T-shirt, 25 cubic meters of water is required. Cotton is mostly grown in arid regions with intense irrigation. Other physical risks that have an impact for textile production are change in water supply, quality, and price. The textile processing demand large amounts of both water and energy, especially in processes as dyeing and bleaching is freshwater an important resource. Despite this physical risk, a large part of textile factories are located in water scare regions. India is no exception, with textile processing in areas where local communities lack access to safe and affordable drinking water (Morrison, Morikawa, Murphy, et al., 2009).

Wastewater and water quality presents reputational and regulatory risk for the apparel companies. Local ecosystems and water resources can be affected by agro-chemicals from the cotton plantations. The effects of climate change have increased the need for chemical input in the cotton growing. However, many apparel manufactures and retailers do not consider these risks, but do instead consider the cotton production as outside their sphere of influence. Water scarcity can cause a regulatory risk and affect licences to operate and change the pricing structure. Manufacturing cost may increase with new and stricter wastewater regulations (ibid).

5.2.5 Summary of key risks for different industries

The key risks for the water-intensive industries presented in this study is summarised in Table 5-2. Water scarcity and climate change will exacerbate the physical risk and lead to increased regulatory risk for companies operating in India. Increased awareness among local and international consumers can influence the company's image and reputation.

Table 5-2: Key risk for different industries

	Physical Risk	Reputational Risk	Regulatory Risk
Paint	Water scarcity Water supply	Wastewater discharge Local water resources Pollution	Water supply Wastewater quality in processing facilities
Food	Raw material production Climate change: decrease crop yield and quality Climate change: increased water demand for crops and livestock	Impact on local water sources Consumer awareness Contamination due to higher water temperatures	Increased competition Pricing structure Wastewater quality in processing facilities
Energy	Water scarcity Raw materials Climate change	Dam-projects Local society	Local society Biodiversity
Apparel	Cotton production Impact on ecosystem Water supply and quality Production in water scarce regions Suppliers	Local society Local water resources Wastewater discharge Pollution	Water scarcity Wastewater quality in processing facilities Increased competition

Source: Morrison, Morikawa, Murphy, et al. (2009)

5.3 Relevant water initiatives for India

When it comes to water-strategies, companies tend to follow the leading companies. More and more companies are moving away from internal water-risk management to more external water management that involves reducing the risk in their value chains. There is a need for an international water-risk debate discussing new ways and tools to account and disclosure water risk (CDP, 2013; Lambooy, 2011). There are huge variations in Norwegian companies participation in international initiatives. In India certifications standards seem to be the norm instead of voluntary principles and the UN Global compact and ISO 26000. Some companies are connected to sector specific initiatives or have developed their own initiatives together with partners (Harildstad, 2013).

5.3.1 CEO Water Mandate

India is one of the focus countries for the CEO Water Mandate by the UN Global Compact, this makes it a highly relevant initiative for Norwegian companies in India. With the CEO Water Mandate it is recognised that the industrial sector both directly and indirectly has an impact on water resources, and therefore it is a responsibility to have a sustainable water management (CEO Water Mandate; Perveen et al., 2012).

5.3.2 ISO 14046 Water Footprint

The ISO standards are well-known corporate standards and the new ISO 14046 standard has the potential to influence and change the current water-risk assessment trends. Water management is increasingly central in the global debate on sustainable development and this is the reason for the new ISO on water. Various methods already exist, and these emphasise on different aspect of water. The new ISO standard on water footprint is expected to ensure consistency in assessing and reporting water footprints (Daniel & Sojamo, 2012; ISO, 2013).

6 Results and recommendations

It is a call to action for policy makers, investors and the business community to take positive action to address the India water crisis and create a more resilient future for all.

CDP (2013:6)

Chapter 3, 4 and 5 has presented the theoretical framework for water use, the water situation in India, and the water risks the four Norwegian water-intensive industries face in India. This section will discuss the results of the analysis on how water issues India are affecting Norwegian companies and how Norwegian companies can involve water issues in their CSR-strategy. A suggestion for how water can be included in CSR strategies is summarised in Section 6.8 and in a model shown in Figure 6-1 and 6-2.

6.1 Water issues for India

There is increased recognition also in India that climate change is affecting and will continue to affect their water resources in the future. Water can cause a geopolitical risk in India, as rivers are dependent on the Himalayan glaciers on the Tibetan plateau. A close cooperation on water policies with their neighbouring countries, China, Pakistan, Nepal and Bangladesh will be crucial in the future.

International reports by the UN and the IPCC have found that India will be water-stressed by 2020, this is sooner than previous estimates, and to secure water for its enormous population there is a demand for action by the Indian government now. India needs efficient policies and regulations on water, in order to meet the challenges caused by climate change, overpopulation and urbanisation. In India, as in many other countries, agriculture is the largest consumer of water resources. However, in the future will water insecurity especially affect industries that are dependent on agricultural produce, for example food processing and textiles (Perveen et al., 2012).

6.2 Water issues for companies

Companies need water management first of all to secure own operations, but also to secure the local environment they are operating in. To address the impacts of climate change all

sectors have to improve their practices and follow up. Water management will play an increasingly important role to ensure sustainable development and adaptation to climate change (Daniel & Sojamo, 2012). The global water footprint scenario by Erkin and Hoekstra (2014) presented in Chapter 4 showed that it is possible to reduce the water footprints to more sustainable levels, even with an increasing population. To make this happen other drivers, such as consumption patterns, have to change.

6.3 Norwegian companies experiences with water in India

The Norwegian companies presented in this study are from four different water-intensive industries, however, they face several of the same water-related business risks. Water supply and access to raw material exacerbated by climate change pose the main physical risk. Degradation of local water resources, tensions with local society and increased consumer awareness are the main reputational risks, while wastewater discharge, water scarcity and increased competition are the main regulatory risks for water-intensive industries in India. The experiences from the Norwegian companies interviewed in this study show that they do take environmental responsibility for their activities. The companies are all in water-intensive industries, and it is likely that they will have to calculate and report on their water risk and water use in the future, if they are not already doing it. Some of the companies have their own initiatives on environment and water use, other use certifications as their main tool in environmental management.

6.4 Drivers to reduce corporate water

Companies with a strong water management “are characterized by having comprehensive knowledge of water use across their value chain and the impact (current and projected) that water-related issues have on their business and vice versa” (CDP, 2013:13). These companies also have action plans to mitigate risk of negative impacts on the local water basin they are operating in (ibid). According to Lambooy (2011) drivers to reduce corporate water can first of all be of financial reasons, as the price for freshwater is increasing. Water in India is still very cheap, so this may not be the main driver for companies in India. A second driver is to be less dependent on freshwater for industrial activities, since both the availability and the quality are under pressure. However, this dependence varies from region to region and on type of business activity. The third driver is to maintain a good reputation among

stakeholders, a driver that is important for all regions and businesses. The case of Coca-Cola in India is an example on how local conflicts can have huge impact on a company's reputation. A fourth driver can be to avoid too much attention from local authorities, which could potentially implement stricter regulations. The last driver to reduce corporate water can be to contribute in solving global water issues and to achieve MDG 7 (Lambooy, 2011).

6.5 Criteria for sustainable water management

Distribution of water becomes a global issue, since the world's water resources are so unevenly distributed. A normative question to rise would be whether water-rich nations should support water-poor nations in efficient and sustainable water use (Hoekstra & Chapagain, 2008). Today, companies are expected to take social and environmental responsibility for their activities. ISO 26000 Social Responsibility states that organisations and companies have to take the responsibility of the impact of their operations and contribute to sustainable development (Standard Norge, 2010). A possible game changer in corporate water management is the new ISO 14046 Water Footprint, with this standard there will be an increased focus on measuring sustainable water use. Water management will increasingly be an essential part of a company's CSR strategy.

Strategies can be developed in order to benefit from the opportunities and avoid the risks, however, in the end it is pretty much up to the international community to set the rules. It is therefore useful for companies to participate in global initiatives on water, such as UN Global compact and its CEO Water Mandate. Hoekstra and Chapagain (2008) list several international agreements that are needed, one of them are water pricing that covers the whole value chain of water. They claim that "without an international treaty on proper water pricing it is unlikely that a globally efficient pattern of water use will ever be achieved" (ibid:141). Another suggestion is to establish tradable water-footprints permits that could be comparable to the Kyoto Protocol on greenhouse gas emission, which has been effective since 2005. Several international forums have discussed the water challenge without addressing the need for making international agreements. An international treaty would create awareness and affect decisions also among those consumers that are located far away from the production site and not see the direct effects on the local environment (ibid).

According to Aldaya et al. (2012) companies have two possibilities to reduce their total water footprint, either reduce their operational water footprint, or cut their supply chain water footprint. To do this it can be useful for companies to use measures and tools that are intended for their location, such as the India Water Tool. The Indian government is putting a stronger pressure on the industry to adapt international practices of water management, this has to be taken into account by Norwegian companies' water management as well. Water audits should be included to understand the water use in their industrial sector, companies should also incentivise water conservation and be transparent with experiences.

Based on the theory and data found in this study the author suggests some criteria for sustainable water management that can help companies to maximise their contribution to sustainable development. The criteria are that companies seek to:

- Be aware of their own water use and water use in the whole value chain,
- Reduce water their operational water footprint,
- Reduce water their supply chain water footprint,
- Minimise wastewater discharge and pollution,
- Implement efficient water treatment,
- Contribute to innovation and new solutions,
- Join international initiatives and discussion on water challenges,
- Influence stakeholders and share experiences, both locally and internationally.

6.6 Recommendations for Norwegian companies

A goal for companies should be to ensure that their use of water resources are sustainable, that the local ecosystems are not harmed by their activities, and that water is not taken away from local agriculture. Agriculture is using most of the available freshwater, but there will be a demand for increased food production in the future. Especially in countries with large populations like India, the industries should take their part of the responsibility so secure food production. ISO 26000 Social Responsibility provides a guide for how companies can maximise their contribution to sustainable development (Figure 3.2). Based on ISO 26000 and on the criteria for sustainable water use a four-step process for sustainable water management is suggested in this section. This process is summarised in a model in Figure 6-1 and Figure 6-2.

6.6.1 Measure water footprint and assess water risk

The impacts of companies' water use vary greatly depending on local hydrological, social, economic, and political factors. Unlike greenhouse gas emissions, which have the same impacts regardless of where the emissions are generated, one unit of water is not equal to another: the same amount of water withdrawn in an arid urban area versus a rural wet region has completely different impacts and associated risks for companies.

Morrison, Morikawa, Murphy, et al. (2009:29)

Chapter 5 exemplified the different types of water-related business risk the Norwegian companies face in India. In the first phase, companies have to measure their water footprint and assess their water risks. It is important for companies to assess both the risk in their own operations, and in their value chain. The new ISO 14046 Water Footprint will serve as a good starting tool at this phase of the water management. The water footprint data needs to be converted into actual impact and risks because of the regional and time-specific factors. Companies need to assess the potential physical water risk by looking at the local hydrological conditions. To understand the water risk at a specific location the India Water Tool can be useful for companies in India (WBCSD, 2014). A company's activities may have an impact on local ecosystems and cause a reputational risk for the company. Socio-economic conditions as local water capacity, regional demand and water pricing may cause a potential regulatory risk (Morrison, Morikawa, Murphy, et al., 2009).

6.6.2 Take responsibility for activities

A mapping of environmental risk clarifies the company's resource use, contribution to pollution, consequences of climate change and impact on local society. Recognition of the impact of the company's activities on the water quality and quantity is important to understand the different types of water risk. In this phase, companies have to acknowledge their CSR in their own influence zone. Background information on climate from IPCC and other can be highly relevant as a part of this phase. Companies that have mapped their water use and water risk have the possibility to plan for different scenarios. ISO 26000 Social Responsibility provides a good overview of how an organisation can implement and develop a CSR-strategy for their activities and value chain (Standard Norge, 2010).

Collaborating with stakeholders and prioritising actions can make the process of implementing environmental CSR easier. Initiatives as the UN Global Compact and the sub-initiative CEO Water Mandate can help and engage companies in their sustainability work.

Using these international standards and initiatives can help companies to share experiences and get inspiration from other companies (CEO Water Mandate, 2014).

6.6.3 Integrate water issues in business strategies and plans

In third phase, the company develop and integrate a corporate water policy to guide operations in the whole value chain. A corporate water policy is essential to communicate policies and expectations to stakeholders. In order to understand local water demands, it is important for companies to engage stakeholders and get continuous feedback. An open dialogue with the local community can be helpful to prevent and reduce the future water risk. According to Morrison, Morikawa, Murphy, et al. (2009:30) a corporate water policy should include the following: (1) A statement on why water is important for the business; (2) how, and to what degree, company activities impact water resources; (3) challenges the business faces in water management. The new water management plans should be implement with clear goals and targets. Potential impacts climate change may cause on water supplies and water quality have to be considered. The water risk management should cover the whole value chain and foster engagement along the supply chain (ibid, Standard Norge, 2010).

6.6.4 Disclose and communicate

The final phase is that the company start to report on management activities and share key information openly. This is positive publicity for the company, and can engage stakeholders and employers on the importance of water. However, few large companies actually report on water-related risks or describe programs to assess water risks. There is a need for reports with site-specific information and consistent methods and metrics to be able to compare and fully understand water risks (Morrison, Morikawa, Murphy, et al., 2009).

As companies and investors start to recognise the materiality of water-related business risks, there will be more pressure to publish water information in both non-financial (e.g., sustainability or CSR reports) and financial reports (e.g., annual reports or SEC filings).

Morrison, Morikawa, Murphy, et al. (2009:32)

Some companies have recognised the importance of water disclosure, and this is becoming a top priority also in India. Corporate water disclosure can be a good tool to give relevant information to stakeholders, raise general awareness and to foster action and dialogue. Corporate disclosure of water usage by business is needed, to raise awareness among

stakeholders, develop standards and an effective disclosure programme, and finally, to ensure that disclosure is linked to action (ibid, CDP, 2013).

6.7 Business opportunities in water

In this study, the focus has been on how companies can deal with water issues to avoid different types of risks. However, it is possible to turn water risk into a competitive advantage for the company. This section suggests approaches to identify these business opportunities.

6.7.1 Innovation

Companies can generate profit through more efficient and innovative water use. A company's commitment to water management will be positive for the company's public image, and help build positive relations with the local society. New technologies within water saving and wastewater treatment is a fast-growing market. Using these technologies can save and reduce the water use, reduce energy demand and cost for recycling of water (Morrison, Morikawa, Murphy, et al., 2009). Decreasing water use and streamlining the supply chain can reduce the cost for water use and wastewater discharge. Another opportunity for manufacturing companies is to develop products that demand less amount of water, so-called "water-savvy" products. Product labelling of water-savvy products can be a tool to reach out to consumers, as consumers are increasingly aware of the environmental impact of their product and want environmentally friendly produced products. Water labelling of water-intensive products would make consumers aware of the water use required to produce their product and the impact this has on water systems (Hoekstra & Chapagain, 2008).

6.7.2 CSR as strategy

Through sustainable water management, companies can turn their water risk into opportunities and improve the water situation in communities they are operating in. Water-intensive industries as the Coca-Cola company has changed their water policies and committed to be "water-neutral". The Coca-Cola water management framework has focus on three components: reduce, recycle, and replenish. Through these three components, the Coca-Cola company seeks to reduce the amount of water, build production facilities that safely recycle water back to the environment, and to replenish water through support of local watersheds and community water programs. Further, the Coca-Cola company collaborates

with the World Wildlife Fund to achieve large-scale results in conservation of freshwater resources (Morrison, Morikawa, Murphy, et al., 2009).

6.8 Model for sustainable water management

The four-step process presented in this Chapter is summarised in a model for how companies can include water as part of their CSR strategy. This model can be useful for Norwegian operating in India. A simplified version of the model is shown in Figure 6-1, Figure 6-2 shows a detailed version of each phase, with relevant tools and initiatives.

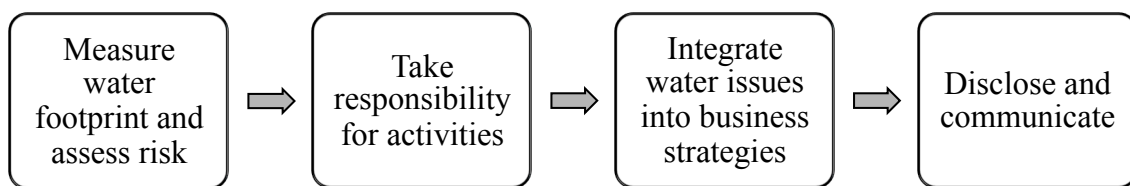
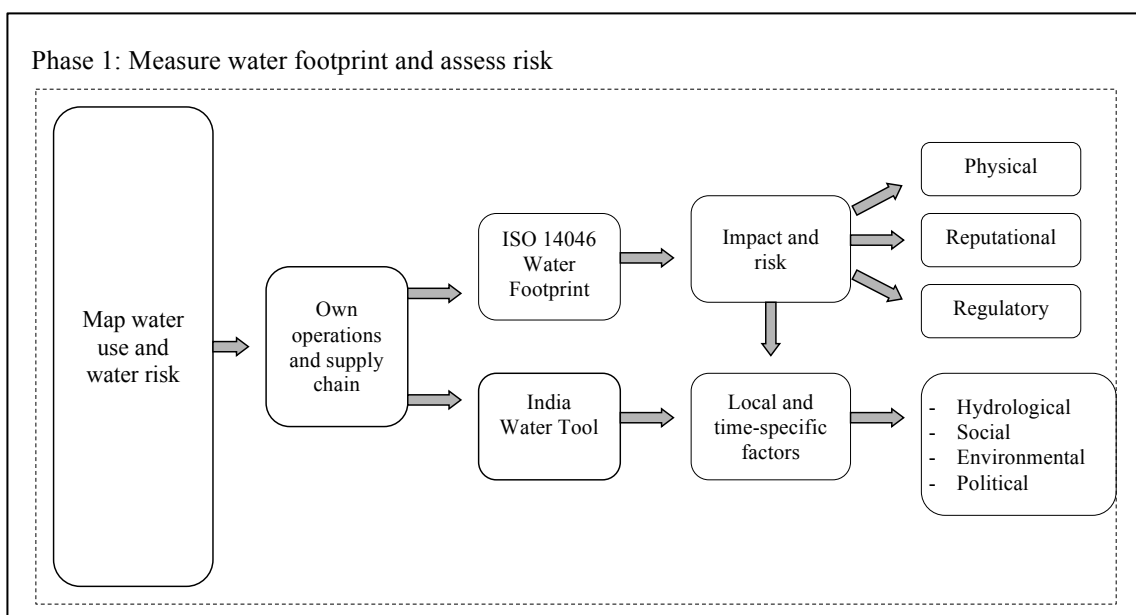


Figure 6-1: Model for sustainable water use



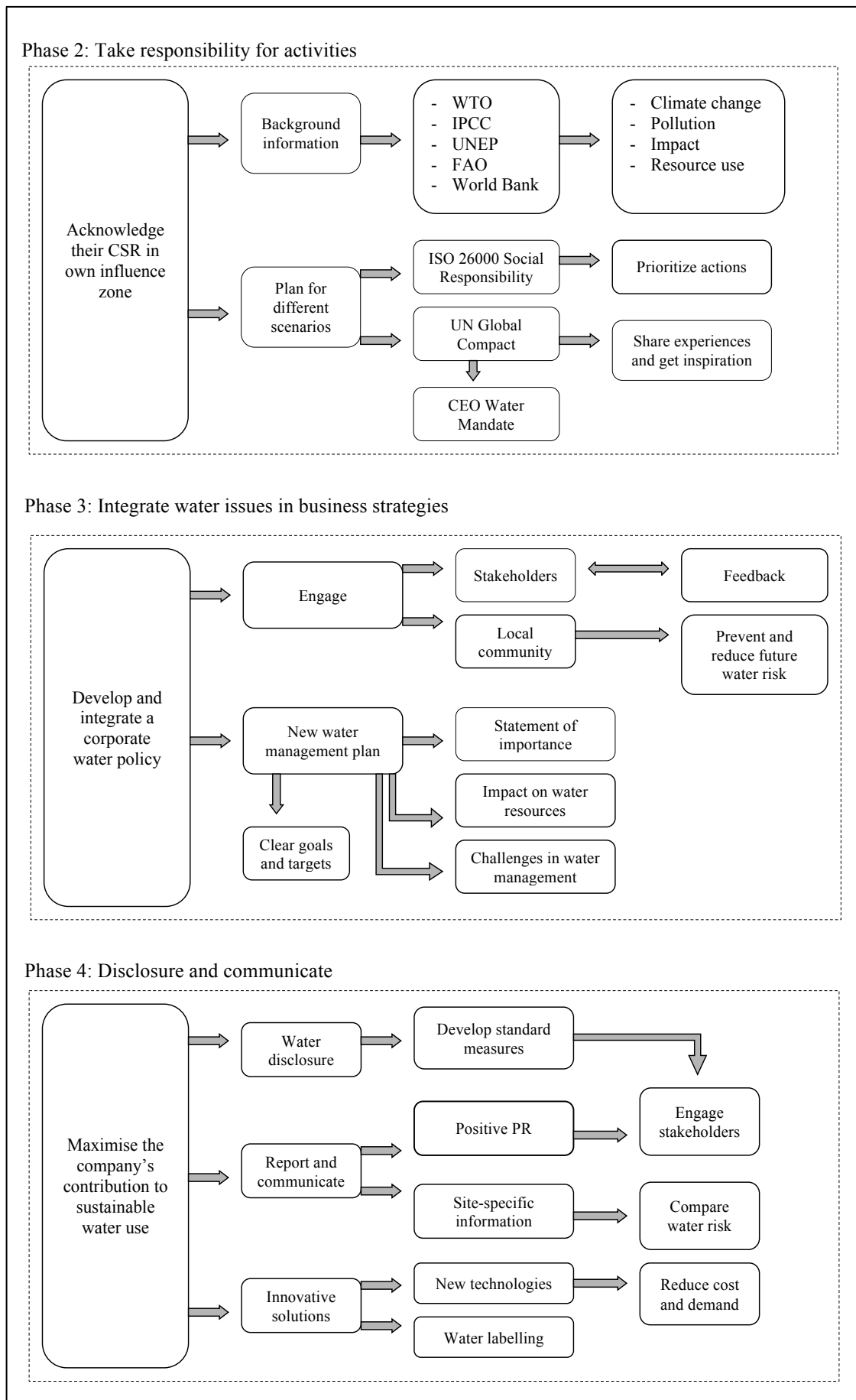


Figure 6-2: Detailed model for sustainable water use

7 Discussion

This study has looked into the water issues in India, and through the selection of four water-intensive companies with production in India looked at Norwegian companies' experiences of water usage. To be able to do this, relevant theories on water management and corporate social responsibility have been presented, together with guidelines and initiatives that are relevant for companies. The outcome of this study has been a suggested model for sustainable water management.

This Chapter discusses the results and recommendations generated from this study. To support the discussion the research questions that were raised in the beginning of the study will be discussed. The first section discusses the quality of the results, and suggests further research on water issues and CSR. The last section of this Chapter discusses the strengths and limitations, and the validity and reliability of this study.

7.1 Summary of results

The main purpose of this study was to present an overview of the water situation in India today, and look at how this is affecting Norwegian companies. To achieve this some research questions were raised to guide the study:

- *How can CSR be linked to water use?*
- *What are relevant concepts and initiatives for water use and water risk?*
- *What kind of water risks do Norwegian companies face in India?*
- *How can Norwegian companies involve water use in their CSR?*
- *What can a possible model for sustainable water use be?*

The two first research questions “*How can CSR be linked to water use?*” and “*What are relevant concepts and initiatives for water use and water risk?*” were covered in Chapter 3, which presented a global overview of different aspects of water, relevant concepts on water use, water management and CSR, and relevant international initiatives on CSR and on water. The new ISO standard, ISO 14046 Water Footprint, will be a highly relevant tool for companies to measure water use. The third research question, “*What kind of water risks do*

Norwegian companies face in India?”, was answered by Chapter 4, which presented the water situation in India, and by Chapter 5, with an analyse of the water-related business risks the different sectors face in India. The final research questions, “*How can Norwegian companies involve water use in their CSR?*” and “*What can a possible model for sustainable water use be?*” were the focus of Chapter 6, which established that water risks increasingly will be an issue for Norwegian companies in India, and that Norwegian companies to a larger degree have to take environmental concern into their CSR. Chapter 6 suggested some criteria for sustainable water use and a model for sustainable water use that Norwegian companies can use as a part of their CSR.

7.1.1 Interviews

The findings from the interviews with Norwegian water-intensive industries in India showed that most companies take environmental concern and water issues into consideration. However, this is not the main focus in their CSR. The reason for this can be that CSR in India is much more about philanthropy, as contributing to schools and unprivileged is viewed as more typical CSR.

The interview guide was developed as a part of a research project about general attitudes and experiences with CSR among 13 Norwegian companies in India. Because of this, the interview guide is broader than it would have been if the companies were interviewed purely on water management and environmental CSR. The interviews generated more general information on the different companies’ CSR policies than concrete information on water issues in India. However, the interviews gave the author an impression on how Norwegian companies work with CSR and which challenges they face in India. The four selected companies were used as examples on types of water-intensive industries found in India.

7.1.2 Water risk

The analysis showed that Norwegian companies operating in India could face all the three types of water-related business risk, physical, reputational and regulatory risk. All these three risks may lead to a financial risk for the companies. The analysis does not discover whether the major concern for the companies is related to the financial risk or an environmental risk of their operations. There are limited research and literature available on water risks for different

industries in India, therefore have Morrison, Morikawa, Murphy, et al. (2009) served as the main, and in some cases, the only source.

The key risks for the different industries showed that the companies face several of the same risks. Water scarcity and climate change will exacerbate the physical risk and lead to increased regulatory risk. Increased awareness among local and international consumers can influence the company's image and reputation. From the results of the interviews, there is reason to assume that Norwegian companies do take environmental responsibility for their activities. The companies follow the regulations in India and it is likely that they will have to calculate and report on their water risk and water use in the future. Certification standards are more common than voluntarily initiatives on water and CSR, the new ISO 14046 on Water Footprint will be an important tool for Norwegian companies to measure and assess their water risks, and it will make it easier to compare companies' environmental performance.

7.2 Discussion of recommendations

Norwegian companies operating in India have the capability to be in the lead when it comes to environmental CSR. In general, Norwegian companies are known to take their CSR seriously, however, the results of this study have generated some criteria for sustainable water use and recommendations for how companies can involve sustainable water use in their CSR.

7.2.1 Criteria

There are strict regulations on water use for industries in India, and some of the Norwegian companies even have their own measures and initiatives on water. However, it is recommended that Norwegian companies join international initiatives as the UN Global Compact as well, to ensure quality and consistency. Other criteria for sustainable water use are that companies are aware of their own water use and risk. Companies should use their position to influence their suppliers and stakeholders to reduce water use and minimise wastewater discharge in the whole value chain. Contribution to innovation and new technological solutions can benefit both the company, through building of image and reducing costs, and local ecosystems, through more environmental-friendly production and safe water resources.

The water footprint can be seen as a new indicator of sustainability, in addition to other sustainability indicators such as the ecological footprint, carbon footprint etc. One of the problems with the water footprint is that it only presents known data in a new format, and that no new knowledge is added. A positive aspect of the water footprint is that it brings a new perspective on issues as water scarcity, water dependency, sustainable water use, and global trade (Chapagain, 2006). The new standard, ISO 14046 Water Footprint, may have a great impact on corporate water management. The standard links the water footprint concept to corporate water use, and makes it easier for companies to involve water usage in their environmental management.

7.2.2 Model

Norwegian companies operating in India should ensure that the use of water resources is sustainable, and that they through a good CSR-strategy contribute to sustainable development in the region they are operating in. As a contribution to further research on sustainable water management, this study suggested a four-step process for sustainable water management based on ISO 26000 and on the criteria for sustainable water use. This process has been summarised in a model (Figure 6-1 and 6-2). In this model, specific criteria for different industries are not a part of the model. The sector specific water risks discovered in this study could be implemented in the model together with specific criteria for different water-intensive industries to get a more precise model for each company.

7.3 Further research

This study discovers that there is little information on Norwegian companies water risks when operating internationally. In general, the research on water management with the link to CSR is limited and it is therefore possible to assume that more research would be needed on this topic in the future. This study has used four different water-intensive industries as cases, however, a more in-depth study of each industry's water risks and water management would be valuable in future research. Further research could collect data not only from the company itself but also stakeholder and local communities. Another approach could be to select one of the industrial clusters or regions in India for in-depth research on the use of water resource.

7.4 Strengths and limitations

There are several challenges for implementation of a CSR-strategy in India. The Indian mentality of development and understanding of what CSR involves differs from the Norwegian perspective. Other challenges can be a high level of corruption and substantial differences between levels of the society. The results from this study are therefore mostly applicable for Norwegian companies, however, the water risks are the same for all companies. One of the main strengths of this study is the structure with a detailed overview of initiatives on water and CSR, and the selection of Norwegian water-intensive companies in India. This study can serve as a framework to understand the link between water management and CSR in India. Since this research is limited by time, it has only been possible to cover a small selection of companies. The results should not be universalised, i.e. assumed to be true for Norwegian companies in other countries. Similarly, these results do not represent all water-intensive industries found in India. Since this study is based on the companies' information, this study is not as critical as it would have been if there had been time to go more in-depth of each industry.

The suggested model that is presented in Section 6.8, Figure 6-1 and 6-2, is a general model for sustainable water management. Each industry has to customise the model to fit their operations and locations, however, it can serve as a starting point. The model is constructed for Norwegian companies in India, it is reasonable to assume that Norwegian companies face some of the same water risk in other countries, where the same international initiatives will be relevant.

7.5 Validity and reliability

To ensure that the results are valid and reliable, the data collected in the interviews were confirmed by other studies on CSR in India. Some of the informants were contacted to get more in-depth information on the water management their industry, and to clarify information. The main threat to validity in this study is that data presented for analysis is mainly based on the companies' own information, it has not been time to do in-depth studies of each company to verify the information. Each company's CSR performance is analysed out from their own information, and this study can be claimed to suffer from insufficient data collection from different stakeholders. The informants participating were mainly a part of the company's top management with responsibility of HR or sales, and few had CSR as their

main responsibility. Interviewing people further down in the organisation, the local society and stakeholders of the company could have ensured a stronger validity.

The selected companies represented different industries with partly or fully Norwegian ownership, located in different Indian states and with various sizes. 13 companies originally participated in the research project. The informants were interviewed about their companies CSR-policies and activities. The issue of the water situation was not the main topic in the interviews, but a part on the environmental section of the interview guide. Had the main topic been environment and water the outcome of the interviews may have been different. To ensure validity of the study the data gathered in the CSR-project is therefore used as background data, not the main data for analysis. The data from the interviews do not directly answer the research questions, but gave the author an impression of how Norwegian companies incorporate environmental CSR in their strategies. Since there have been limitations in time to collect own data a further step to ensure validity is the use of triangulation. Research and reports from global initiatives have supported the findings from this study. Internal validity of this study is also ensured through using specific concepts and measures that are confirmed by citing literature and published research on the same topic.

The case in this study has been the water situation in India in a CSR context, with Norwegian companies within water-intensive industries as subunits for analysis. The use of the case method in this study has some limitations since it is difficult to generalise out from a sample with few cases. To ensure analytic generalisation the research questions and research design focuses on how Norwegian companies can deal with water issues, and suggest a model for improved water management.

The findings in this study are based on qualitative interviews and on the companies' public information and other research. It is therefore reason to assume that the research in this study is reliable, and that other researcher interviewing the same or other companies in India would achieve similar results. The research process and the results of this study have been transparent, which makes the study replicable for other. Transferability of methods and process has improved the reliability of the study.

8 Conclusion

Reports by the UN and the IPCC, states that climate change is likely to exacerbate many of the already pressing factors for India's natural resources. There is an increased awareness on water issues among consumers, investors, policymakers and industries all over the world. This study has used the water situation in India as a case and suggested a model for sustainable water use that Norwegian companies can use in their CSR strategy.

The main focus in many CSR-strategies is on labour rights. There is little information available on how Norwegian companies deal with environmental issues when operating internationally. This study has exemplified how and why water issues should be a part of a company's CSR, and what initiatives that is relevant for companies in India. In this study, the author has described the linkage between water issues on a macro level and on companies' level, and suggested criteria for sustainable water use for companies. The water footprint concept is generally on a macro level, through the new ISO 14046 Water Footprint the concept is transformed to a micro level that companies can work with.

The water situation in India was presented as a case, with Norwegian companies as subunits. Semi-structured interviews with four water-intensive industries representing food, apparel, paint and energy, were used as background information for an analysis of water-related business risks in India. The results of this study indicate that Norwegian companies will face an increased water risk in India in the future. If the companies have not already taken the measures necessary to deal with these water issues, it is about time to implement a model for sustainable water use in their value chain. Such a model is suggested as a part of this study (Figure 6-1 and 6-2) and can be a good starting point for Norwegian companies to involve water use in their CSR strategies.

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9.2 Informants

Name	Position	Company	Date of interview
Rahul Deshmukh	Senior HR Manager	Jotun India Private Limited	14.10.2013
K.E.Roy	Head of Organizational Development & Talent Management	MTR Foods	15.10.2013
Lars Ellegård	Managing Director & Country Head	SN Power India Pvt. Ltd.	23.10.2013
Viky Singh	CSR responsible for the region	Varner Group	25.09.2013

Appendices

Appendix I: Interview guide

Interview guide: Attitudes towards CSR in Norwegian companies in India

1. Introduction

Present yourself, CSR research for Innovation Norway, master thesis about CSR etc.

Explain about the interview; purpose, confidentiality, recording of interview etc.

2. Background info

Can you tell me a little about yourself; name, position, and for how long time has you worked for...?

3. Info about company –

Asking about the company - how they describe their company

Ownership/Main product/Customers

Where are the production facilities located?

Reasons for location

Knowledge about supply chain

Creation of value

Important partners

Specific challenges – where

4. General about CSR

Definitions of CSR

Norwegian regime vs. Indian regime - Where can they be placed in the model

Experiences and main challenges

5. CSR in company

Asking about the company's CSR agenda – remember to ask about the informants own experiences related to the theme

Knowledge about the company's CSR agenda

Written guidelines

Do the factories know about the CSR agenda? Company and suppliers. Child labour,

Health and safety standards

Actions to improve working conditions, safety etc.

Agenda against discrimination? Cast issues

Environmental concern

Committed to any agreement (Global Compact etc.)

CSR-policy builds on Global Compact, TI, ISO 26000?

Why, why not

Connected to Norwegian bodies like IEH, or sector specific bodies (INTSOK; INTPOW, MNE)

Partners, CSR work through NGOs etc

Awareness of CSR rules and regulations in India

Effects of the Companies Bill: What is the company's policy, plans

Consequences of the Companies Bill – thoughts/plans

Have CSR-work paid off? (CSR and innovation)

Cases

6. Anti-corruption work

General introduction about corruption in India.

Main challenges etc

Sectors

Other/own experiences

Company's anti-corruption policies

Challenges/issues with corruption, on which level, to which extent

How common is it with corruption in the business environment the company operates in

What does the company do in this context?

Policy against corruption

Guidelines for handling corruption dilemmas and -issues.

How is it implemented?

Followed up, monitoring, auditing, control,

What works in India and not, compared to other countries.

7. Innovation Norway

Cooperation with IN

What is your experience with IN

Participated on IN CSR seminar in April

IN's competence on CSR

How can IN improve (provide more information, hold seminars etc., related to CSR)

8. Ending

Anything else that you want to say about this topic?

Switch of recorder - answer any question from the informant.

Appendix II: UN Global Compact

The Ten Principles

Human Rights	<p><i>Principle 1:</i> Businesses should support and respect the protection of internationally proclaimed human rights; and</p> <p><i>Principle 2:</i> make sure that they are not complicit in human rights abuses.</p>
Labor Standards	<p><i>Principle 3:</i> Businesses should uphold the freedom of association and the effective recognition of the right to collective bargaining;</p> <p><i>Principle 4:</i> the elimination of all forms of forced and compulsory labor;</p> <p><i>Principle 5:</i> the effective abolition of child labor; and</p> <p><i>Principle 6:</i> the elimination of discrimination in respect of employment and occupation.</p>
Environment	<p><i>Principle 7:</i> Businesses should support a precautionary approach to environmental challenges;</p> <p><i>Principle 8:</i> undertake initiatives to promote greater environmental responsibility; and</p> <p><i>Principle 9:</i> encourage the development and diffusion of environmentally friendly technologies.</p>
Anti-Corruption	<p><i>Principle 10:</i> Businesses should work against corruption in all its forms, including extortion and bribery.</p>

Source: UN Global Compact. (www.unglobalcompact.org/AboutTheGC/TheTenPrinciples/index.html)

Appendix III: Global water footprint scenario

Table of drivers and associated assumptions used in the global water footprint scenario, Ercin and Hoekstra (2014:73)

Drivers and assumptions per scenario.

Driver	Scenario S1:	Scenario S2:	Scenario S3:	Scenario S4:
	Global market	Regional markets	Global sustainability	Regional sustainability
Population growth	Low-fertility	High-fertility	Low-fertility	Medium-fertility
Economic growth ^a	A1	A2	B1	B2
Consumption patterns	Diet Bio-energy demand	Western high meat Fossil-fuel domination	Western high meat Biofuel expansion Drastic biofuel expansion	Less meat Drastic biofuel expansion
Global production and trade pattern	Trade liberalization (A1B + TL2)	Self-sufficiency (A2 + SS1)	Trade liberalization (A1B + TL1)	Self-sufficiency (A2 + SS2)
Technology development	Decrease in blue water footprints in agriculture	Decrease in blue water footprints in agriculture	Decrease in green and gray water footprints in agriculture Decrease in blue and gray water footprints in industries and domestic water supply	Decrease in green and gray water footprints in agriculture Decrease in blue and gray water footprints in industries and domestic water supply

^a The scenario codes refer to the scenarios as used by the IPCC (Nakicenovic et al., 2000).

Percentage change in the water footprint of production, Ercin and Hoekstra (2014:77)

Percentage change in the water footprint of production compared to 2000. 'A' refers to WF of agricultural production, 'D' refers to WF of domestic water supply, 'I' refers to WF of industrial production and 'T' refers to total WF.

Region	S1				S2				S3				S4			
	A	D	I	T	A	D	I	T	A	D	I	T	A	D	I	T
USA	105	24	16	87	154	57	20	128	49	-1	-9	38	59	12	-13	46
Canada	139	26	57	118	193	58	44	161	84	1	37	70	80	13	18	66
WEU	19	-3	-45	12	51	22	-28	42	-34	-23	-57	-36	-28	-13	-46	-29
JPK	-52	-20	-16	-46	-24	1	-15	-21	-75	-36	-31	-68	-60	-28	-34	-55
ANZ	221	40	-75	217	255	77	-50	251	55	12	-77	54	34	26	-57	33
EEU	50	-24	833	150	85	0	274	107	-17	-39	393	36	-17	-30	355	31
FSU	46	-18	1,649	135	83	10	531	105	-12	-34	735	30	-11	-24	529	19
MDE	40	44	208	46	157	88	80	151	1	15	122	5	78	32	41	74
CAM	143	21	341	142	204	63	127	196	37	-3	198	39	44	13	142	45
SAM	372	24	474	361	441	66	158	422	172	-1	262	168	149	15	160	144
SAS	67	38	1,160	84	149	85	353	150	-10	11	1,495	16	25	28	653	36
SEA	127	32	953	151	191	76	257	188	32	6	458	45	37	22	400	49
CHI	89	-12	1,885	137	127	16	338	129	-22	-29	555	-6	-22	-19	967	6
NAF	32	43	533	44	81	90	236	85	2	14	651	17	27	32	112	29
SSA	179	122	863	181	367	183	243	364	78	78	649	81	184	101	335	184
RoW	114	-9	71	106	195	11	12	177	12	-27	-11	9	34	-20	110	36
World	112	18	601	130	180	55	158	175	18	-6	311	30	38	9	261	46

Percentage change in the water footprint of consumption, Ercin and Hoekstra (2014:79)

Percentage change of the WF of consumption relative to 2000. 'A' refers to the WF of agricultural products, 'D' refers to the WF domestic water supply, 'I' refers to the WF of industrial products and 'T' refers to the total WF.

Region	S1				S2				S3				S4			
	A	D	I	T	A	D	I	T	A	D	I	T	A	D	I	T
USA	29	24	112	41	83	57	69	80	29	-1	50	30	39	12	28	36
Canada	48	26	95	54	91	58	52	83	5	1	55	13	14	13	38	18
WEU	19	-3	112	28	52	22	65	52	-27	-23	52	-19	-24	-13	12	-20
JPK	11	-20	113	19	39	1	50	38	-36	-36	58	-26	-29	-28	15	-25
ANZ	172	40	107	171	201	77	62	199	20	12	73	20	5	26	13	5
EEU	12	-24	1024	143	45	0	285	75	-47	-39	438	17	-41	-30	419	20
FSU	6	-18	975	61	39	10	268	51	-44	-34	366	-20	-37	-24	340	-15
MDE	198	44	720	207	309	88	229	294	99	15	436	106	153	32	152	146
CAM	100	21	865	115	165	63	264	163	9	-3	490	20	24	13	292	30
SAM	117	24	722	126	181	66	204	177	21	-1	370	27	29	15	231	32
SAS	128	38	1206	143	214	85	313	212	27	11	1399	49	55	28	676	64
SEA	96	32	769	117	160	76	169	156	2	6	317	13	16	22	338	27
CHI	79	-12	1391	113	117	16	205	116	-29	-29	346	-18	-25	-19	771	-3
NAF	65	43	811	81	122	90	298	125	25	14	881	45	50	32	171	52
SSA	353	122	1415	355	538	183	334	531	179	78	969	181	263	101	486	262
RoW	212	-9	893	240	274	11	211	259	37	-27	366	52	51	-20	400	67
World	112	18	596	130	180	55	157	175	18	-6	308	30	38	8	259	46

The change in the water footprint of consumption per capita per region for the different scenarios relative to 2000 volumes, Ercin and Hoekstra (2014:81)

