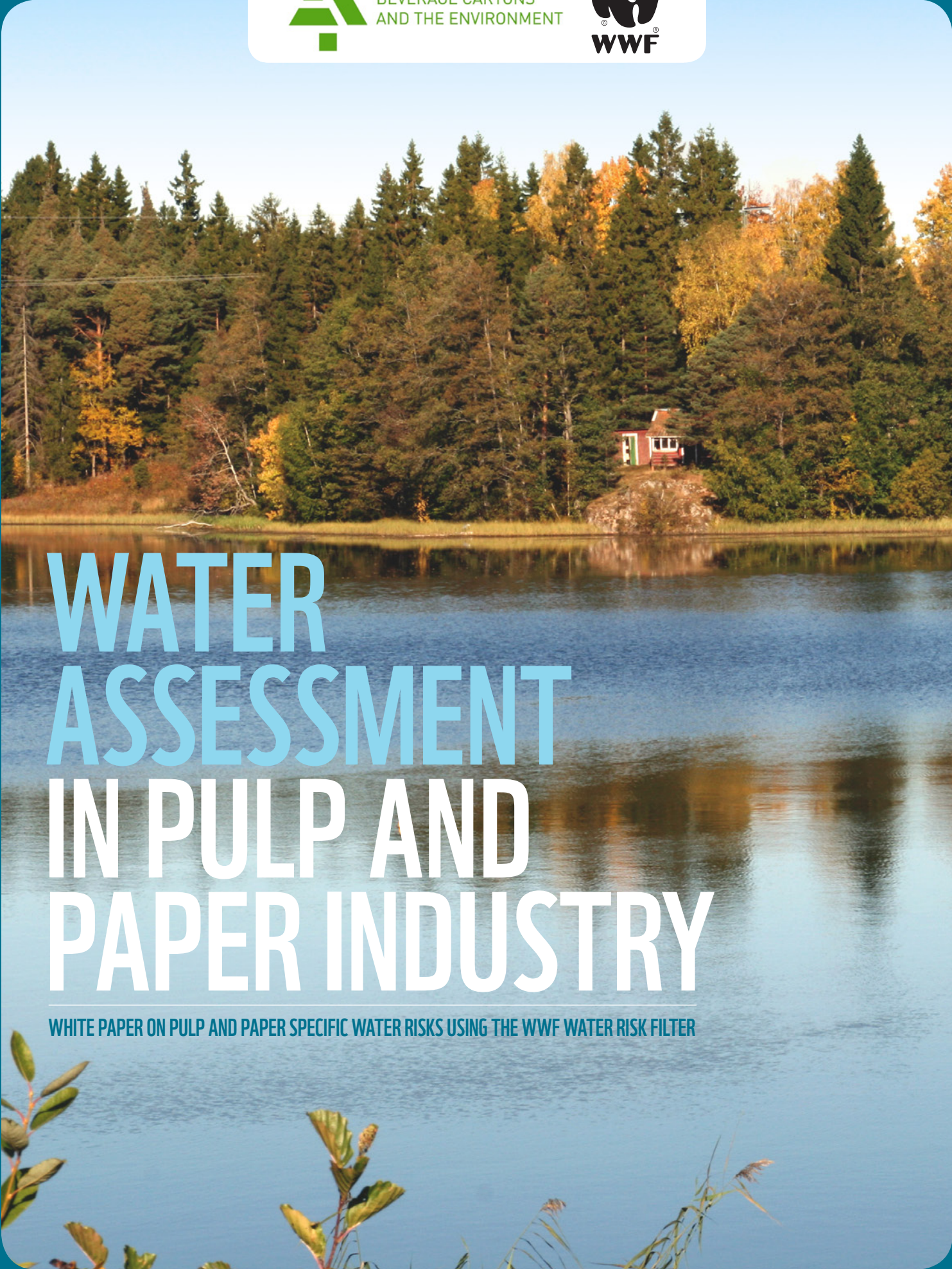




THE ALLIANCE FOR
BEVERAGE CARTONS
AND THE ENVIRONMENT



WATER ASSESSMENT IN PULP AND PAPER INDUSTRY

WHITE PAPER ON PULP AND PAPER SPECIFIC WATER RISKS USING THE WWF WATER RISK FILTER



THE ALLIANCE FOR
BEVERAGE CARTONS
AND THE ENVIRONMENT



WWF

Photos: Study trip to Frövi mill ©ACE

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ABBREVIATIONS

ACE	- The Alliance for Beverage Cartons and the Environment, www.ace.be
ADT	- Air dry tonne of pulp product
AOX	- Adsorbable organic halogens
CDP	- Carbon Disclosure Project (i.e. Water)
DEG	- Deutsche Investitions- und Entwicklungsgesellschaft - German Development Bank, www.deginvest.de
DJSI	- Dow Jones Sustainability Index
ECF	- Elemental chlorine free
GRI	- Global Reporting Initiative
LPB	- Liquid Packaging Board
WRF	- Water Risk Filter, www.waterriskfilter.panda.org
WWF	- World Wide Fund for Nature, www.panda.org
WWT	- Waste Water Treatment

SUMMARY

Freshwater is becoming scarcer and its uneven distribution will increase. Other pressures on water resources are also increasing or are not yet being adequately addressed. Therefore, the value of water as a precious resource is becoming increasingly apparent with a growing population and demand worldwide. In this context, the members of the Alliance for Beverage Cartons and the Environment (ACE) are committed to the preservation and responsible use of this resource which is crucial in the manufacturing of the raw materials like those used in beverage cartons.

ACE members are therefore proactively engaged in assessing and addressing water-related risks. They are as well advising and are actively involved in the development of a paperboard specific industry add-on to the WWF Water Risk Filter (WRF). This tool, developed by the WWF (the Global Conservation Organization) and DEG (the German Development Finance Institution), is designed to help companies and inves-

tors to ask the right questions about water - to assess and mitigate potential risks. The WRF is designed to be easy to use, yet robust in the results that are generated. The aim of the development is to help companies globally in formulating mitigation strategies to drive down hazards and to better respond to water issues – and by doing so, become better water stewards.

Initiated in 2010, the tool development is now in its fourth phase, partnering with DEG. The fourth phase has the aim to further improve the assessment and risk presentation capabilities (e.g. mapping and portfolio analysis) as well as to continue updating the latest available data sets for the underlying automated part of the assessment. The ability to obtain information tailored for disclosure and reporting platforms [e.g. Carbon Disclosure Project (CDP), Global Reporting Initiative (GRI), Dow Jones Sustainability Index (DJSI)] and linking assessment outcomes to the development of specific risk mitigation strategies on the ground is also further supported,

particularly by connecting the tool to the WWF Basin Stewardship strategies.

To make the tool more meaningful for particular industry groups, WWF worked together with ACE and its members to develop a refined version of the Water Risk Filter's company risk questionnaire for the pulp and paper industry, and gather case studies as well as additional mitigation responses for specific guidance to the pulp and paper industry.

Two facilities of Billerud-Korsnäs and one of Stora Enso located in Sweden, were chosen as pilot facilities due to the easy access to operational staff for a test application of the newly developed company questionnaire of the Water Risk Filter for the pulp and paper industry.

Through this exercise, ACE and WWF gained deeper and highly valuable understanding of water related processes in state-of-the-art pulp and paper mills and subsequently developed an industry specific questionnaire for the WWF Water Risk Filter to share the acquired knowledge with the global user base of the Water Risk Filter (consisting of industry risk questionnaire and mitigation options and case studies). Due to physical location and high level production water standards applying to the pilot sites through the European Union (EU) water regulations, low water risk was indicated for both the basin and the company (operational) levels. It will be

important therefore to further apply the revised, industry specific, questionnaire in areas and operations experiencing more water challenges. It also has to be recognised that this project was particularly focused on operational aspects of the industry and less on the environment they are located in, where very limited water risks are present. This was indicated by the basin related risk assessment of the WRF and confirmed by the companies' environmental engineers on the ground.

Water challenges and risks need to be assessed and understood before they can be adequately managed or mitigated. Therefore understanding industry's operational water cycle is crucial. The required action is then both of internal (such as efficiency and quality improvement

measures) and of external nature – beyond the company's fence line – engaging in collective action on the basin level if major shift within a basin is desired. In the future additional efforts need to be undertaken by companies to understand and connect internal and external water related risks to business.

The outcome of this project with the collective insight of participating organizations will provide an added value to the pulp and paper sector through the Water Risk Filter and can also provide a starting point to further explore water risk and water stewardship within individual

Water challenges and risks need to be assessed and understood before they can be adequately managed or mitigated. Therefore understanding industry's operational water cycle is crucial.

company’s portfolio.

As part of the current Water Risk Filter development the outcome of this project will be integrated into the Water Risk Filter website and be available online to all users of the tool.

This White Paper brings together acquired knowledge from the stakeholder workshops and describes the significance of water related business risk specifically for the pulp and paper industry.

INVOLVED ORGANISATIONS AND THEIR INTEREST IN WATER

THE ALLIANCE FOR BEVERAGE CARTONS AND THE ENVIRONMENT

Freshwater is becoming scarcer and its uneven distribution will increase. Therefore, the value of water as a precious resource is becoming increasingly apparent with a growing population and demand worldwide. Freshwater plays an essential role as a unique and inevitable natural resource also in the beverage carton supply chain. Acknowledging this, ACE members have two objectives: to efficiently manage water resources on site and to recognise water use as a part of the future strategy for further environmental adaptation.

Beverage cartons, on average, are made of 75% paperboard. ACE member companies are committed to source the wood fibre from responsibly managed forests.

ACE members have two objectives: to efficiently manage water resources on site and to recognise water use as a part of the future strategy for further environmental adaptation.

Water plays a central role in the liquid packaging board (LPB) production process – the main ingredient of a beverage carton. The structure of paper depends on water, which is needed to extract and carry wood fibres through the production process, and to form the desired characteristics of the paper. Water withdrawal in LPB manufacturing is relatively large, but water consumption is low.

According to the Water Exploitation Index¹, all ACE members’ LPB mills are located in water rich areas, i.e. in Frövi, Gruvön, Gävle and Skoghall in Sweden and Imatra in Finland. All wastewater streams are carefully purified in a treatment plant before being released back to the natural environment.

WORLD WIDE FUND FOR NATURE

WWF is one of the world’s largest conservation organizations. WWF’s mission is to stop

the degradation of the planet's natural environment and to build a future in which humans live in harmony with nature, by conserving the world's biological diversity, ensuring that the use of renewable natural resources is sustainable, and promoting the reduction of pollution and wasteful consumption. WWF is also a strong advocate for responsible private sector engagement on water issues, and has long worked with companies on watershed protection. Business leaders realise that their long-term profitability depends on the right quantity and quality of water available at the right time and place to meet the needs of people, business and ecosystem. This business interest triggered the creation in 2008 of WWF's Water Stewardship Program². The WRF was developed as a global tool and platform to engage with industry partners. The WRF promotes WWF's concept of Water Stewardship and helps non-water

The Water Risk Filter was developed as one tool and platform with global and all industry applicability. The WRF promotes WWF's concept of Water Stewardship

experts starting the conversation around water within their business and sector. Through using a comprehensive water risk assessment framework as well as providing incentives and concepts of next steps through the tool's Mitigation Toolbox it provides multiple pathways to become familiar with water risk and stewardship implications to business and response development. Understanding the situation (basin related risk) and impact (company related risk) on facility and company portfolio level is the key to a comprehensive water stewardship strategy, to go beyond the factory's fence line and to engage in collective action to manage water sustainably on catchment level.

SETTING THE SCENE – THE LINK BETWEEN THE PULP AND PAPER INDUSTRY AND WATER

WATER QUANTITY

The pulp and paper industry is one of the most water intensive sectors. Large amounts of water are required in the use phase for cooling and processing but are usually only to a minor extent consumed within the production. Almost all of the withdrawn water is released back to the environment. It is often unlikely that water volumes can be reduced drastically without impacting on the operation. However, some efficiency measures are possible such as process water recycling and/or replacing old processes with less water intensive technologies.

WATER QUALITY

Furthermore the pulp and paper sector is historically seen as a very polluting sector. Production processes themselves can be highly polluting and therefore business risk related to water in this sector comes down to the safety measures and procedures for preventing polluted water to leave the facility and impact the environment. This is also the case in the pilot sites of this project where, due to legal requirements, highly

polluted process water is cleaned on site to the necessary and required quality before it can be released back to a recipient water body. The pollution caused by a facility thus depends on the level of effort and safety as regards purification of the process water.

WATER REGULATION

The regulatory environment consists of different components. There is the regulatory quality on the one side and the actual enforcement on the other. Problems appear where regulation is of poor quality and needs enhancement or where regulation enforcement is poor. Here the possibility of non-consideration and non-compliance with fundamental state-of-the-art water management components increases the company's vulnerability upon change. Since the pulp and paper industry relies on large amount of water with certain quality requirements a high quality regulation with strong enforcement is in favour of this industry and its business continuity.

WATER REPUTATION

Beside the regulatory license to operate, business-

ses (i.e. the pulp and paper production) also rely on a social license to operate. If a business fails to meet social expectations (i.e. in relation to water quantity and quality issues) it can experience the scrutiny, not only by the local social environment but also by customers, consumers and civil society groups. The awareness about water challenges around the world is increasing and the demand for disclosure and transparency is increasing as well supporting more stable reputation.

THE CONCEPT OF WATER RISK

The strong growth of interest of businesses in water stewardship over the last ten years was spurred by the realisation among companies and investors that water could put at risk the reputation of a company, and even more importantly its direct operations and the availability of sufficient

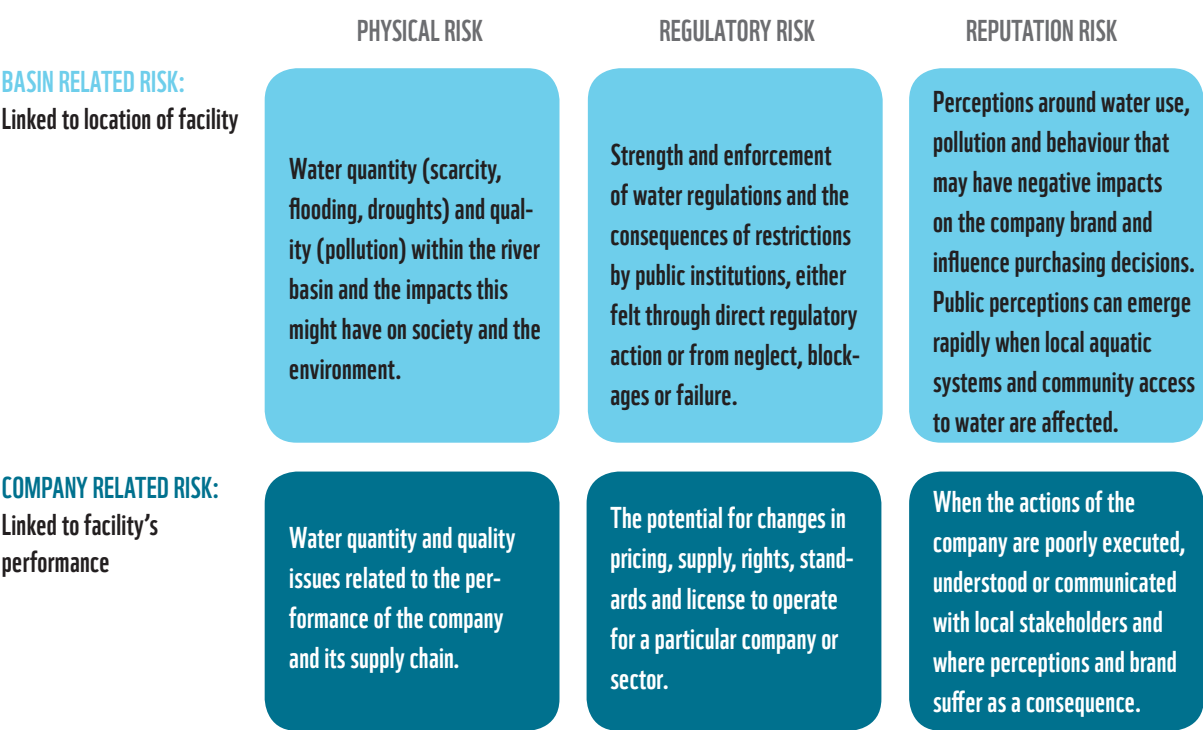


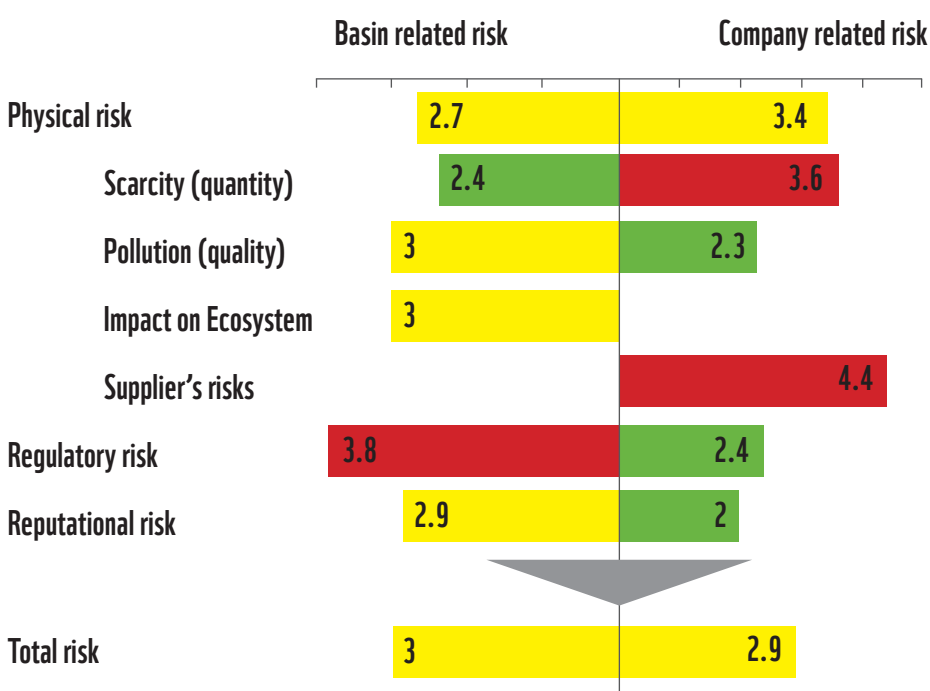
Figure 1: Types of Water Risk (WWF Water Stewardship Brief 2013)

amounts of water of the required quality levels. An interruption of that availability could lead to immediate and often significant financial consequences such as having to halt the production, shifting supplier, or even completely closing local operations (i.e. so-called stranded assets).

Figure 1 presents the framework for assessing the water risk. The risk assessment consists of three groups of risk types (i.e. Physical, Regulatory and Reputational Risk). They are assessed on the one hand based on information from the situation of the surrounding basins (basin related risk; beyond a factories' fenceline) and on the other hand based on particular process information of the facility (within the factory's fence line). Beyond operational management, risks need to be addressed with methods such as collective action on catchment level as well as the influence of governance rather than purely implementing efficiency meas-

The Water Risk Filter (WWF/DEG) is a free online tool and platform to help assess business' water risk based on indicators of a facility's surrounding (basin related risk) as well as its operational aspects (company related risk). It empowers companies and investors to make informed decisions in order to avoid any negative impacts to the company, surrounding communities, and other water users. The results can inform internal water management processes and help develop location specific water risk reduction measures. This is done by guiding the user through the tool's mitigation toolbox, case studies, and country water profiles. The assessment consists of a local evaluation based on global datasets for the basin related risk and of a questionnaire addressing one's operational water risk on facility level (i.e. the company related risk).

In a world of growing disclosure demand, this tool not only raises awareness of relevant water issues, but also helps the user to identify risk hotspots as a starting point for developing further steps. www.waterriskfilter.org



ures inside-the-fence-line.

Through the project, water related risks for one facility of Stora Enso and two facilities of Billerud-Korsnäs, all located in Sweden, have been assessed using the Water Risk Filter.

The key results of the water risk assessment are presented in this document. All sources, definitions and methodologies of the risk indicators can be found in the online tool as well (www.waterriskfilter.panda.org).

The focus of many companies is the assessment of basin related risks with a focus on scarcity and pollution impacts. To mitigate these risks, the response is often to improve water efficiency and water quality, which actually will predominantly lower the company risk.

In order to reach a level of sustainable water resource management, the company (or any stakeholder for that matter) will be required not only to adapt its internal practice, but also to engage in the external environment where risks are present. In this case, the focus lies in improving and supporting better basin cooperation

and dialogue in order to engage with key stakeholders and improving the general state of how the river basin is governed. Almost always, a combination of internal and external action will be required to manage risks.

Within this project for the pulp and paper sector we used a different approach due to limited amount of pilot sites (i.e. three) and their location within a generally low risk environment (i.e. low basin related risk in Sweden) confirmed through a dialogue with the local company expert representatives (i.e. site environmental engineers).

It became evident that within this exercise a particular focus was on the operational risk of a facility (i.e. company related risk) and on finding an advanced approach to addressing operational water risk for the pulp and paper sector.

Almost always, a combination of internal and external action will be required to manage risks.

WATER RELATED RISK WITHIN THE PULP AND PAPER INDUSTRY BASIN AND COMPANY COMPONENT

Following the approach shown in Figure 1 the pulp and paper sector can be generally characterised through three risk categories. This study particularly focused on company related risk, linked to the behaviour of company's operation; however for completeness purposes both basin and company related risks are briefly described below.

Physical Risk – The pulp and paper industry is exposed to quantitative and qualitative physical risk in their operations. Naturally, large amounts of freshwater are required within this particular industry. Most of the required water is used as process water which is not consumed within the production process but is highly loaded with pollutants (including temperature) causing negative impacts on environment when not treated properly prior to its release into the recipient water body. The operation requires constant and reliable access to vast amounts of water of certain quality (higher water pollution levels would incur costs for water treatment) to

guarantee economic production. Physical risks can have natural causes or are triggered through other stakeholders within the catchment (e.g. pollution event, and upstream over-abstraction).

Regulatory Risk – Due to potentially large impact as regards water quantity and water quality, the pulp and paper industry is controlled by many laws and regulations which can differ substantially between different countries. More importantly the effect of these laws and regulations depends on the level of their implementation and enforcement. Changes in water licences, water pricing and allowed pollution levels in the effluent have a particular high impact on the cost of operation. Constant improvement of water efficiency and treatment efforts have to take place to respond to the regulatory framework. Regulatory compliance issues can appear within a company and are imposed through local or regional governments. Regulatory risks are lower in well regulated environments where the company is not faced with sudden and fre-

quently changing regulations imposed by governments.

Reputational Risk – If a company and/or particular parts of the operation perform insufficiently or even attract a wider negative media attention this can challenge the acceptance of the company and its products by basin stakeholders (local population, NGO's, other industries, governments). The license to operate might be challenged, even beyond the facility, on company and sectoral level. Disclosure of and gaining knowledge about its own operational and sectoral environmental impacts are seen as the main pathways for showing willingness of the company to improve and to show success and lessons learned. A poor reputation may also affect the industry's attraction to future co-workers.

The Water Risk Filter framework brings more clarity about issues a company might face due to its location by providing the so called basin risk results and deepens the understanding of the water related risks by applying the framework particularly on the operational side using company risk indication. In the dialogue with the two ACE members, BillerudKorsnäs and Stora Enso WWF's Water Risk Filter questionnaire was analysed with the goal to improve its applicability to the pulp & paper sector.

Stora Enso and BillerudKorsnäs water risk assessment

Water related risk was assessed for three pilot sites located in Sweden with the goal to refine the assessment methodology for the pulp and paper industry. To assess the risk for all three sites the Water Risk Filter (www.waterriskfilter.panda.org) was applied. Basin related risk was automatically assessed based on the geographic location and company related risk was assessed by filling in a questionnaire for each of the sites of each company.

The initial basin risk analysis indicated low risk for all three locations (i.e. basin risk) within Sweden due to abundant availability of water with high quality, strong and enforced water regulation and low to medium reputational issues. Therefore the project focused on assessing the company related risk, i.e. the operational component of the risk assessment.

In the following section, we will first describe the approach of revising and refining the company risk questionnaire to produce a modified version adapted for the pulp and paper sector. Further, we will explain how refined results from the three pilot locations were used and the lessons learned were discussed throughout the pilot phase between ACE, pulp and paper companies and WWF. We will conclude with showing how the new modified pulp and paper questionnaire can be used by the sector for improved Water Risk Assessment.

The approach – refining the company risk questionnaire for the pulp and paper industry into a pulp and paper specific questionnaire

In an initial step the standard water risk assessment was applied to Stora Enso's Skoghall mill and BillerudKorsnäs Frövi and Gävle mills. All three mills are integrated pulp and paper mills and are some of the largest producers of liquid packaging board for beverage cartons (i.e. Tetra Pak, SIG Combibloc and Elopak) in Europe. The assessment included the automated basin risk assessment representing risk levels occurring from the environment the facility is located in and the company risk assessment which required each facility to fill in the risk questionnaire for initial risk assessment.

In the analysis phase workshops were held to compare the risk indication provided by the tool and the risk interpretation from the participating companies, including from the individual facilities. Input was provided by the environmental leads of the companies and engineers from each site.

Basin related risk levels of the Water Risk Filter indicated low risk, which was confirmed by company representatives, including local experts (i.e. site environmental managers). For the company's risk assessment the level of risk

indicated by the tool was not shared by the risk understanding of company representative and indicated a good starting point to analyse in detail the tool outcome and company risk understanding and interpretation. The decision was made accordingly to tailor the water risk questionnaire to more accurately represent the pulp and paper industry.

Main observation made in the review process was particularly the high risk indications regarding water dependency and pollution levels within the processes (i.e. company related risk). While the tool in its original design identified these issues as high risk within the facility's operation the industry partners could not confirm this high risk with their interpretation of water related risk. In joint workshops the underlying risk assessment assumptions and results were identified, analysed and refined to improve the assessment of the pulp and paper specific water cycle for both quantitative and qualitative components to avoid oversimplification of the processes evident within the basic questionnaire for this industry.

The standard and refined company risk assessment were then compared to each other and multiple test iterations were carried out to ensure the new version does not under evaluate risk components. In the next step the new Pulp and Paper specific questionnaire will be integrated into the online version of the Water Risk Filter to support other users from the pulp and paper sector to assess their water related business risk.

MAIN REFINEMENTS APPLIED TO A PULP AND PAPER SPECIFIC VERSION OF THE COMPANY RISK QUESTIONNAIRE:

- Considerations of water usage within production processes, i.e. differentiation between process and cooling water and more specific assessment of quantitative impact on water resources.
- Availability of industry relevant quality aspects with the option of choosing between types of quality measurements and quality related project application. There is a need for differentiation between cooling water, which is not in contact with any pollutants (except thermal impact), and process water, which is directly in contact with process materials such as pulp and chemicals. It is related to quantitative and qualitative risk issues. These amounts of water need to be available despite very small consumption rates.
- Consideration of the amount of contact water, which has to be available and is polluted to a certain degree through the production process. Water not being consumed, either by the process through incorporation into the product or through evaporation, needs to be treated before it can be released back into a recipient water body such as a river or lake.
- Consideration of available water treatment types and procedures. High water quality for production cycles is required throughout the production process; at the same time water becomes strongly polluted throughout the process. It therefore becomes particularly necessary to evaluate availability, capability and reliability of the water treatment stage after the process before it leaves the plant into the recipient water body or outside wastewater treatment facilities.
- Overall refinement of language within the questionnaire. This enables industry members to answer the questionnaire with ease by using particular language and definitions to frame the industry specific production water cycle and related aspects.
- Inclusion of additional benchmarking options to select particular sub industries to connect to typical state of the art quantitative or qualitative aspects to make results more comparable across the industry and particularly between different geographies.
- Testing the developed solutions within participating facilities keeping in mind that the specific questionnaire is applicable to the wider pulp and paper industry.

Risk mitigation

Additionally to the refinement of the risk questionnaire, guidance within the mitigation section of the Water Risk Filter was also collected for industry users. The project group was interested in collecting specific case studies for the pulp and paper sector, which are being made available in the WWF Water Risk Filter and will be specifically highlighted for the users of the sector. Moreover, in addition to case studies the pulp and paper industry related mitigation options are being made available in the Water Risk Filter's Mitigation tool box to provide additional guidance for the industry on how to mitigate and manage particular water related risk at their location and operation itself.

Herein, two case studies of BillerudKorsnäs and Stora Enso are presented, describing how two of the pilot facilities of this study have adapted and developed their water management over the last decades, responding to regulatory changes, technological advancement and environmental challenges.

Water management development at BillerudKorsnäs Frövi mill

The awareness of the need for better water management in the Swedish pulp and paper forest industry started to grow some 50 years ago and was followed by the environmental law, research and activities to decrease emissions to water. At that time the paper bleaching technologies were in focus. In the Frövi mill no bleaching was needed, for the actual type of

production, which furthermore from 1981 was concentrated to coated carton board. The first aeriated biological lagoon was established for water purification in 1972. Later on, in 1997, when bleaching started in the Frövi mill the Total Chlorine Free method was also introduced at the site. Since then the production has increased significantly without any increase of emissions to water; instead the emissions have decreased further. This has been possible owing to internal process development, recirculation and more efficient use of water, internal water purification for use in more processes and by continuous improvement of the external purification processes, which the water must pass through before returning to the recipient it was taken from.

The latest improvement action was taken in 2014 when the existing water purification system was supplemented by a preliminary biological stage. The aim was to biologically reduce chelating agents and oxygen-consuming substances in filtrate surplus from the bleaching plant. Previously the filtrate was mainly sent to the evaporation plants for drying, followed by incineration and energy extraction in the recovery boiler. The result so far has been very positive, with an over 90% reduction in chelating agents and an over 80% reduction in oxygen-consuming substances. At the same time, it is estimated that energy consumption for drying residues will fall sharply.

Water management development at Stora Enso Skoghall mill

A pulp mill was established at the site already in 1917. Since then water depending industrial activities have been present, and today the site is

the home of a modern paperboard mill. Before the first introduction of the environmental law in Sweden in 1969, neither industry nor municipalities made any treatment to their waste waters, with a reduced ecological status in the receiving waters as a result. The mill's first waste water treatment (WWT) systems (sedimentation basins) were inaugurated shortly after the introduction of the law, and the WWT systems have been expanded and refined since then.

Today's WWT system includes pre-sedimentation, evaporation, biological treatment in an aerated lagoon as well as chemical precipitation. The mills bleaching system is today an efficient elemental chlorine free (ECF) method optimizing the fiber yield, fiber strength, energy consumption and water effluents with adsorbable organohalogens (AOX) emission levels of 0,07-0,10 kg/ADT³. A lot of efforts have been put into recycling water internally before it is being sent to the waste water treatment plant, and to separate and treat a more polluted waste water stream in for that purpose specially designated facilities.

The mill's relatively large water use is due to the strict product purity demands set on LPB that makes further water use reductions difficult without introducing risks of high microbiological load in the internal water systems that would need to be controlled by the use of pesticides.



LESSONS LEARNED

1. The joint exercise provided WWF with an insight into the pulp and paper sector in northern Europe. Both companies knew there were environmental concerns some 40-50 years ago when the environmental awareness was lower and the legislation weaker, but showed compliance with strictly enforced water regulation to date.
2. The process brought for both, ACE and WWF, a better understanding of water risk related to the pulp and paper sector. It has been realised that it was necessary to develop a specific water risk questionnaire within the WWF Water Risk Filter framework.
3. No high risk was indicated and verified for the piloted locations and their operations. Further testing with the pulp and paper sector companies is required to explore risk based on the company's location in more challenging environments and less resilient operations than those observed with the piloting companies.
4. On the company related risk side, few risks were indicated by the jointly developed risk questionnaire. We recognised that most risks for the pilot sites can be addressed through internal mitigation measures. The project group planned to develop mitigation strategies but found in this case it was more adequate to reflect on past experience of both companies.
5. Both companies are investing in internal operational aspects in expectation of new regulations and technology and working closely with local authorities to maintain their license to operate. These investments are particularly aimed at improving water quality issues as well as efficiency measures and represent a good example for other companies operating in this sector located in less well managed environments.
6. Mitigation strategies are currently purely operational and carried out within the companies or have been carried out naturally, mostly as a reaction to expected regulatory changes.
7. Pulp and paper companies in more water challenged environments should be tested against the new refined water risk questionnaire.

¹The water exploitation index (WEI) is the mean annual total abstraction of freshwater divided by the mean annual total renewable freshwater resource at country level, expressed in percentage terms. Further information may be found at the European Environment Agency (<http://www.eea.europa.eu/data-and-maps/indicators/use-of-freshwater-resources/use-of-freshwater-resources-assessment-2#toc-0>).

²Water Stewardship goes beyond being an efficient water user. It means contributing to the responsible, sustainable management of freshwater resources. To learn more about WWF's Water Stewardship concept visit [wwf.panda.org](http://wwf.panda.org/what_we_do/how_we_work/conservation/freshwater/water_management/) (http://wwf.panda.org/what_we_do/how_we_work/conservation/freshwater/water_management/).

³ The Industry Average for AOX emissions is 0,15 kg/ADT in Europe.

OUTLOOK AND RECOMMENDATIONS

The concept of Water Stewardship provides guidance to companies on how to engage in addressing water issues within their surroundings and operations and on how their business will benefit from this.

This project focussed particular on the three pilot sites, namely Stora Enso's Skoghall mill and BillerudKorsnäs' Frövi and Gävle mills, in Sweden with an in general low basin water risk environment such as low physical (e.g. water scarcity drought and pollution), regulatory (e.g. water regulatory quality and level of enforcement) and reputational (e.g. water issues discussed on local and global media in Sweden) risks. Therefore we could particularly focus on the companies' operational risks and the refinement of a meaningful pulp and paper company risk questionnaire for the application of WWF's Water Risk Filter methodology. This questionnaire can, in the future, be used by other sector companies as a first step in comprehending their water related business risks. Companies can then use the assessment as a starting point to develop resilient water stewardship strategies for facilities and the organisation.

The ACE member companies represent through their pilot mills a good example of best practices in the sector and showcase how companies can manage and react to water related issues. Although both companies pilot facilities are state-of-the-art operation they can look back on a long

track record of improvements and challenges they faced over time in acquiring such a status.

The project team worked on gathering relevant information to support other pulp and paper sector companies to not only recognise and learn about water related issues but also to think of the next step beyond just assessing the situation, i.e. mitigation of water related risks.

Water challenges and risks need to be assessed and understood before they can be adequately managed or mitigated. The required action are of internal nature (such as efficiency and quality improvement measures) and of external nature – beyond the company's fence line – engaging in collective action on basin level if a major shift within a basin is desired.

The project focussed particularly on the internal assessment of pulp and paper companies, refining the assessment methodology (company questionnaire by mapping the water cycle for this particular sector) for a more accurate operational water risk assessment for the sector.

The outcome of this project with the collective insight of participating organizations will provide an added value to the pulp and paper sector through the Water Risk Filter assessment as well as to its mitigation toolbox.



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