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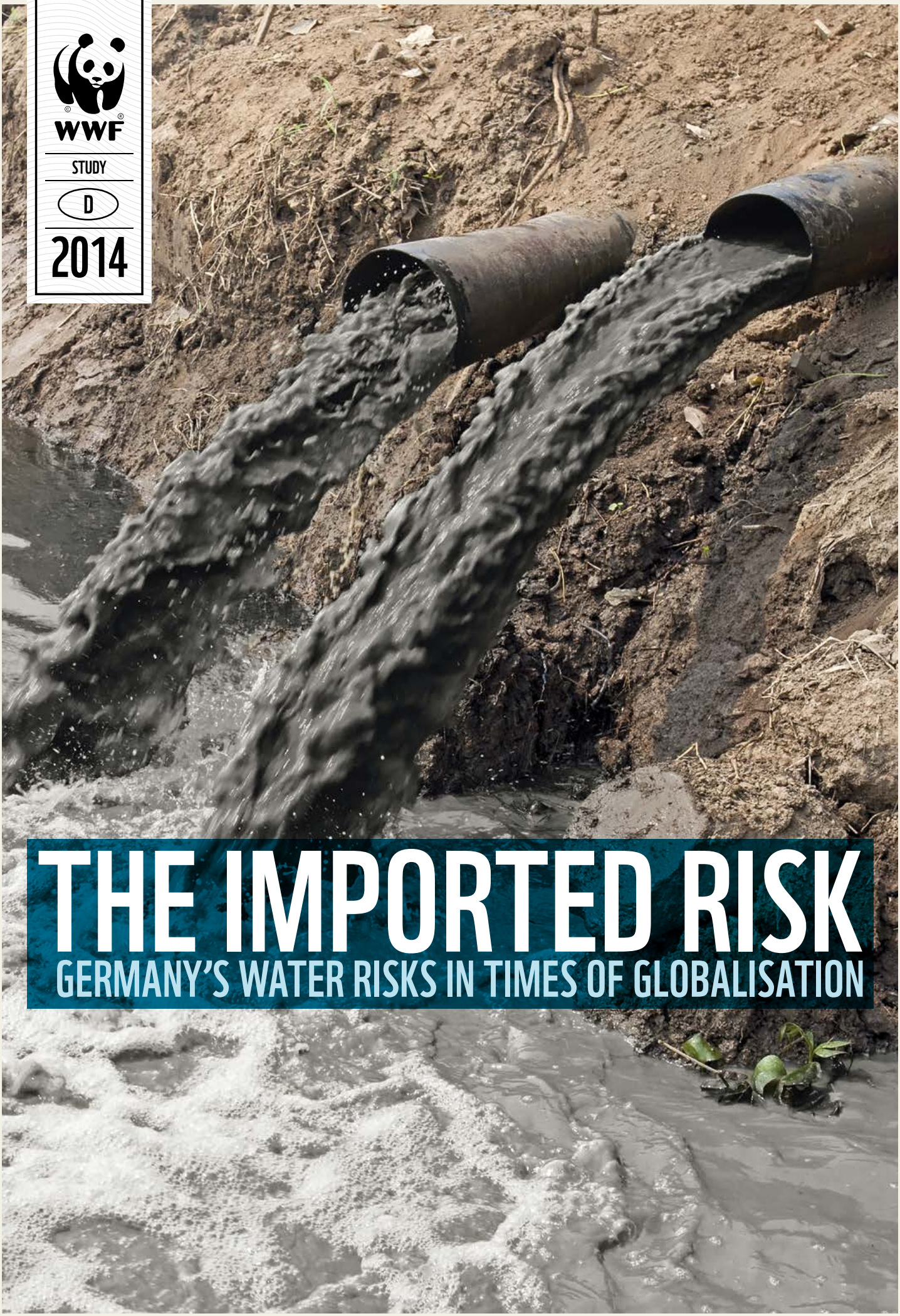

THE IMPORTED RISK

GERMANY'S WATER RISKS IN TIMES OF GLOBALISATION

Front cover:
Next to overuse of water resources, water pollution is a big issue in states where regulation is insufficient and enforcement is weak. In China companies have to move towards better waste water management since regulation is getting stricter each day.

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Note: For consistency, the exchange rate on 20 May 2012 was used to convert US dollars to or from euros. This rate gives the year's approximate average in 2012; on 20 May 2012, €1 = US$1.27.

The private sector is the main water consumer worldwide. Because of globalised supply chains, local water user problems become risks for multinational global supply chains and investments.

1 Executive Summary

In comparison with other countries, water resources in Germany are sufficiently available and well governed. However, being the world's third biggest import nation Germany is depending on goods and resources from abroad. Most of these goods inherit so-called water risks, since they originate in locations with water scarcity, deteriorating water quality, weak governance and regulatory challenges, poor infrastructure, vulnerable communities, and fragile ecosystems. Water risks can be defined in three categories – physical, regulatory, and reputational – and are embedded in a company's direct operations (company-related) and the location of production (river basin-related).

Water is therefore not an issue of the future; rather, it is hitting the bottom line of companies today – and water risk situations around the globe are increasing. Rising populations, changing consumption patterns, and climate change will directly affect water availability and quality, which puts additional pressures onto politics, companies and the society.

Water is not an issue of the future; rather, it is hitting the bottom line of companies today.

Key findings

Based on a combination of their high water dependence and exposure to water risk, four sectors with direct water risks (agriculture, chemical, textiles & apparel, and extractives) and two sectors with indirect water risks (financial services and retail) were selected and analysed. The water risks for the retail and financial services sectors are mostly indirect since they are mostly connected to suppliers and investments. Some examples of countries related to German imports and with high water risk in at least one economic sector are:

» Textiles & apparel – China, Bangladesh and India
» Extractives – Russia, Libya, South Africa
» Agriculture – Ethiopia, Indonesia, Argentina
» Chemicals – China, India, Morocco

Though each sector is exposed to water risks, the stage and intensity at which they arise in the value chain differs. For example, cotton production is the most water-intense segment in the textiles and apparel sector's value chain and is also the segment most vulnerable to climate-induced physical water risks. On the other hand, the chemical industry faces the greatest risk (in countries with lax regulation) during the processing stage due to pollution or connected to the sourcing of raw materials.

Call to action

To reduce water related risks, WWF developed the Water Stewardship concept. This step-by-step approach enables companies to create internal water awareness, analyse their water risks and reduce these through internal and external measures.

A company can rarely reduce all of the water risks it shares with water users in the same basin or other companies along its supply chain on their own. Water stewardship activities aim to drive companies towards collective action with other water users, public authorities or civil societies in a given river basin. The root cause of water risk is often not the availability or use of water, but governance. Water stewardship is an opportunity for companies to contribute to the responsible and sustainable management of freshwater resources in a river basin.

Companies focused on reducing their risks by improving the local situation will have a competitive advantage. They will be able to stabilise their production volumes and quality by investing in long-term customer relations and trusted local partnerships.

In order to get to a sustainable outcome, it is imperative that all sectors – business, government, and civil society – collaborate.

Public awareness of the environmental impacts of production processes is increasing, and expectations of governments and companies to develop sustainable management strategies and equitably share water resources are growing. In order reach a sustainable outcome, it is imperative that all sectors – business, government, and civil society – collaborate.

WWF believes that now is a perfect moment for companies to develop and implement long-term and smart water strategies that benefit more than just the bottom line.

To become good water stewards, German companies should:

» Identify their risks, impacts, and responsibilities related to water

» Mitigate their risk and implement water stewardship strategies

» Develop and implement company-specific water stewardship strategies together with scientists, NGOs, government agencies, and other stakeholders

To become good water stewards, investors and financial institutions should:

» Develop standards and policies for water risk analysis and impacts in their internal decision-making processes

» Systematically assess investment and financing options and assets for water-related risks

» Develop standardised company and asset-based water risk disclosures and engage with company management boards in order to enhance risk management

» Include water-related risks in overall asset and credit risk estimations

» Develop methodologies to translate water-related risks to business value at risk in cooperation with businesses and integrate such metrics into financial decisions

» Develop sector-specific sustainable water risk reduction strategies to address and provide technical assistance for risky clients and/or investments to ultimately mitigate risks together with strategic stakeholders on the ground

» Adhere to initiatives such as the Equator Principles or the UNEP Financial Initiative's water stewardship scheme and develop industry-specific codes of practice when necessary

» Exclude clients from their portfolios that do not appropriately address and manage water-related risks after actively engaging with them on a regular basis

» Disclose their water risk exposure and demonstrate their water risk mitigation actions publicly

» Proactively support companies that are seeking to reduce water-related risks

To become a good water steward, the German government should:

» Engage with governments (also beyond development aid) in selected high water risk countries and river basins that are important to German trade and consumption and develop a deeper understanding of the economic implications of water in local river basins

» Collaborate with key businesses on shared risk and collective action linked to river basins at risk that are important to the German economy

» Deliver on Germany's international commitment as a Party to the UN Convention on Biological Diversity and ensure that the Aichi Targets are met by 2020

To become good water stewards, consumers should:

» Inform themselves about the origin of products and their associated water issues

» Demand sustainable solutions for all products and adapt their purchase decisions

» Demand transparency from companies through various channels (including point-of-sale)

2 Water Risks – From Global to Local

German companies are already strongly dependent on goods and services imported from other countries. Independent of the type of business, clean and sufficient water is often a major input factor for production. Therefore, a company's success directly or indirectly relies on the availability of water resources along the supply chain.

However, water is becoming increasingly scarce; in fact, the World Economic Forum ranks the water supply crisis as one of the top five global risks[1]. Globally, business and economies are coping with the increased frequency and severity of extreme water-related events. According to the Carbon Disclosure Project's (CDP) 2012 Water Disclosure Report, 90% of the German Global 500 companies (that replied) are exposed to water risks in their direct operations or supply chain[2].

Water is not an issue of the future; rather, it is hitting the bottom line of companies today. As pressures increase, so do costs arising from water risks for businesses, governments, and civil society, which is why forward-thinking corporate leaders need to take the opportunity today to rethink their water strategies.

2.1 Water Prospects for German Companies

"Consider any of the 21st century's major global challenges – climate change, population pressures, political upheaval, food security … a common undercurrent is water. No longer a concern limited to the poor and powerless – water has emerged as an issue that has resonance in boardrooms, corner offices, and the halls of power around the globe.

We have to understand and acknowledge the provision of water for human purposes as a service of nature – provided by ecosystems around the world. Without significant reduction of our footprint, impacts will be severe. These negative repercussions are already hitting the economies and the way we produce, process, and transport our commodities in a globalised market. Due to its strong dependency on the international trade of goods, Germany bears a special responsibility. Therefore, wise and sustainable water solutions have to be on the agenda of every single corporation. For the sake of our planet – and out of economic self-interest of any business."
Eberhard Brandes, CEO of WWF Germany[3]

We have to understand and acknowledge the provision of water for human purposes as a service of nature - provided by ecosystems around the world.

Simply avoiding problems and risks related to water will not pay off for companies on the long-run. Companies focused on reducing their risks by improving the local situation (i. e. sustainable management of shared water resources, true collective action with local stakeholders, etc.) will have a competitive advantage over others. They will be able to secure their investments in the long term, optimise their specific risk reduction strategies, and strengthen their public image and reputation. Long-term customer relations, increased trust, and continuous effects – such as stable production volumes and quality – will be direct benefits for these companies.

Due to its international trade and supply chains, the private sector plays a vital role in this context.

Public awareness of the environmental impacts of production processes is increasing, and expectations of governments and companies to develop sustainable management strategies and equitably share water resources are growing. In order to arrive at a sustainable outcome, it is imperative that all sectors – business, government, and civil society – collaborate. Due to its international trade and supply chains, the private sector plays a vital role in this context and

needs to be actively engaged in current and future discussions – not only due to self-interest in ensuring future production, but also because of the sector's responsibility as a major economic player.

2.2 Our Global Water Challenge

Freshwater – the source of life – is unevenly distributed around the globe. Every locality has its own hydrological cycle that depends on a variety of natural factors, yet the problems facing water resources globally are human-made. Demographic growth, economic development, and climate change are accelerating the pressure on our renewable but finite water resources – especially in arid regions.

In the last century, our global water use has increased at more than twice the rate of the population[5]. Though the United Nations made access to safe drinking water a Millennium Development Goal (MDG) in 2000[6] and recognised access to water and sanitation as a human right in 2010[7], life-sustaining and water-supplying ecosystems continue to be destroyed. Already today, billions of more people will be living in regions with high water risk. Whether food, energy, or industrial goods and services – each individual requires more than ever before, which places tremendous pressure on water resources. Already today, increasing competition on local water resources directly impacts companies, governments, people, and nature. Coupled with increasing global temperatures, water risks will continue to grow.

In the last century, our global water use has increased at more than twice the rate of the population.

Global water facts

2.7 billion people currently live in catchments that experience severe water shortages for at least one month annually[8]; 783 million people do not have access to clean water[9].

Globally, around 50% of the wetlands that existed in 1900 were lost in the 20th century. Europe's wetlands declined by 60% in that period[10].

Global water demand will increase by 55% between 2000 and 2050 mainly due to manufacturing (+400%), electricity (+140%), and domestic use (+130%)[11].

Intensive water consumption will aggravate stream-flow drought conditions by 10–30% in southern, western, and central Europe, and to a lesser extent also in the United Kingdom[12].

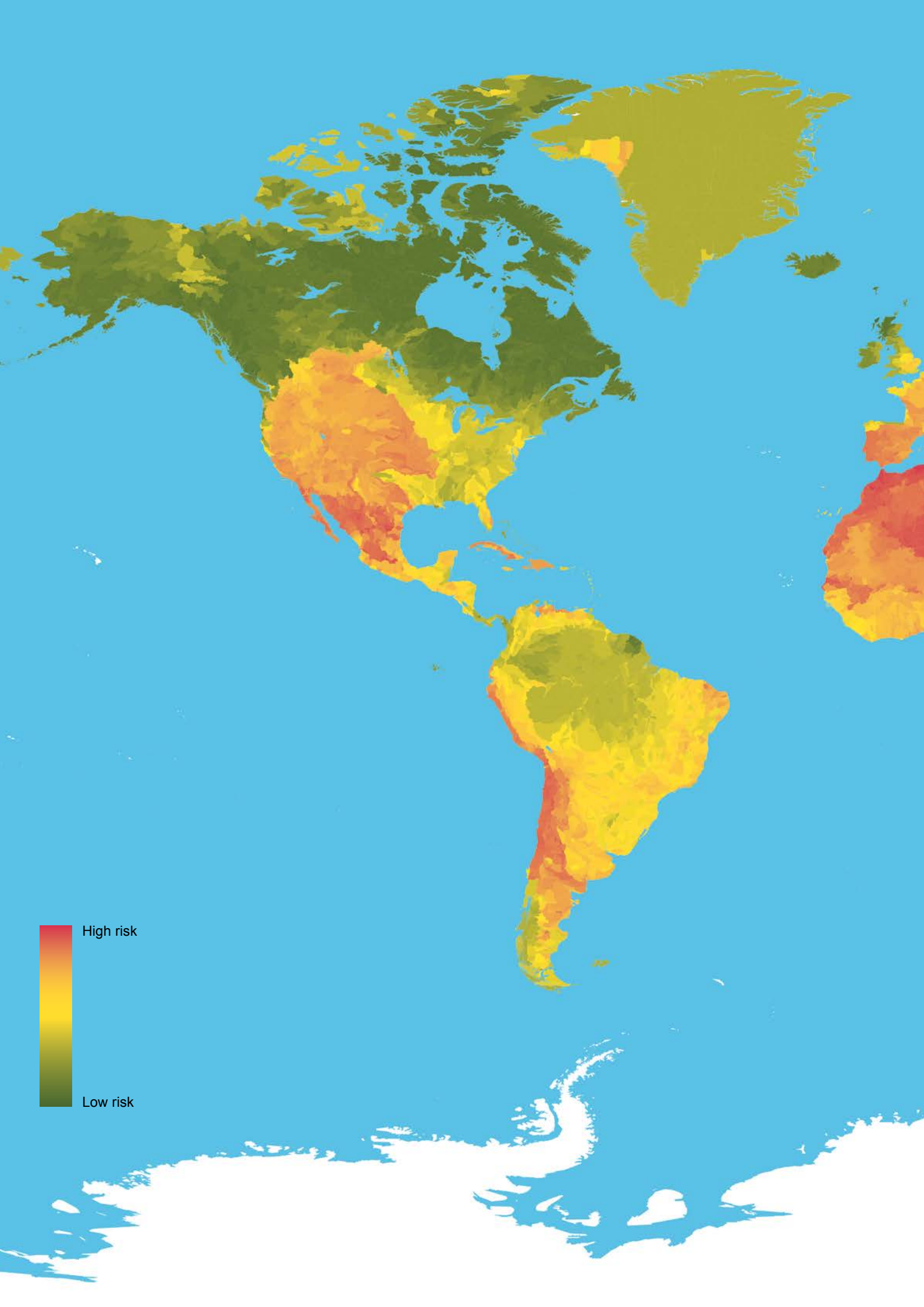
Global freshwater ecosystem health declined by 37% between 1970 and 2008 – more than for any other biome [13].

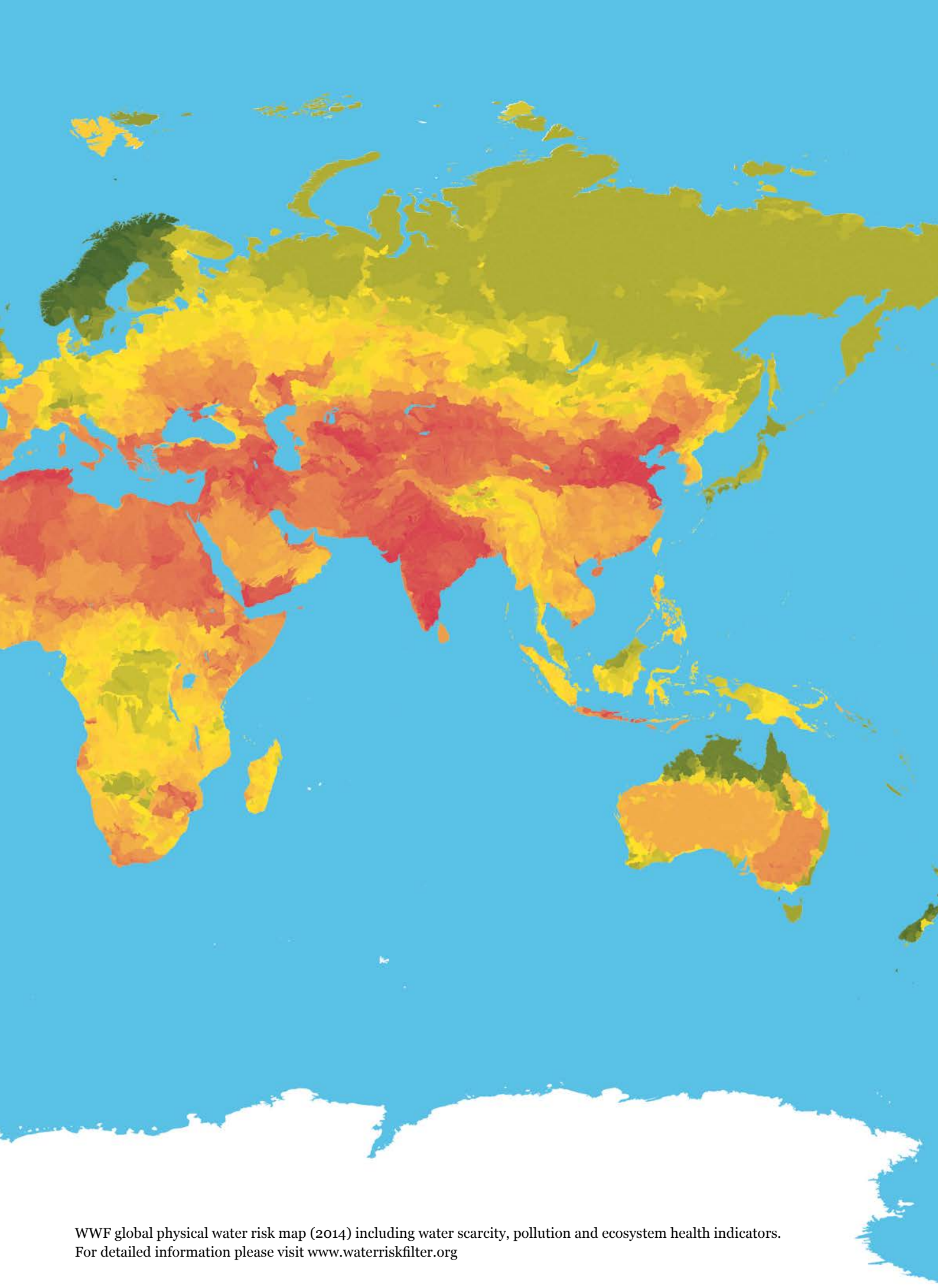
Globally, total freshwater withdrawals increased by about 1% per year between 1987 and 2000; it is assumed that this trend has continued since then at a similar rate[14].

Groundwater supplies are diminishing - an estimated 20% of the world's aquifers are overexploited[15].

Research shows that every €0.79 invested in water infrastructure can deliver nearly €3.94 of wider economic benefits over the long term[16].

Renewable water resources are projected to decrease by at least 20% for an additional 7% of the global population with each degree of warming[17].


High risk
Low risk



WWF global physical water risk map (2014) including water scarcity, pollution and ecosystem health indicators.
For detailed information please visit www.waterriskfilter.org

These developments need new and innovative approaches on how we engage with water, especially from the main water users (agriculture and other other economic sectors). So far, companies have not sufficiently acknowledged their role, namely that they are embedded directly in the middle of "our global water challenge". Therefore, the first important step for a company to reducing water risks is understanding own challenges and risks.

2.3 What Does this Mean for Companies? Setting the Baseline

Water risk

A company's success often directly and indirectly depends on the water resources it needs for production. Water risks can jeopardise a company's production ability and, depending on likelihood and severity, these risks will have financial implications. For these reasons, companies must understand their water risks and strive to sustainably mitigate them.

Water risks can be defined in three categories – physical, regulatory, and reputational – and are embedded in a company's direct operations (company-related) and the location of production (river basin-related).

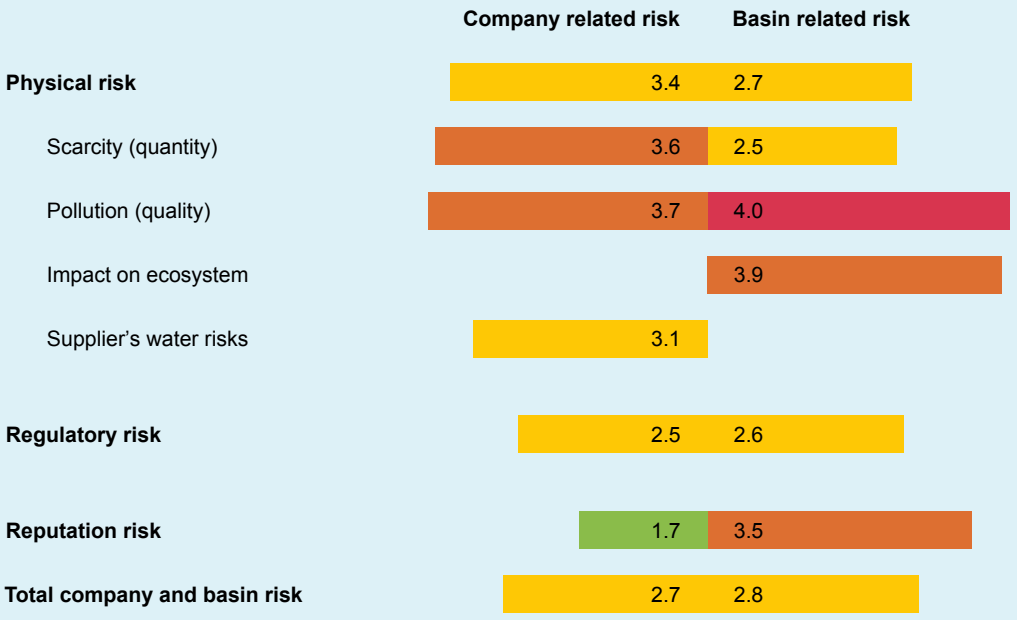
	Physical risk	Regulatory risk	Reputational risk
Basin-related risk (linked to location)	» Water quantity (availability, scarcity, flooding, droughts), quality (pollution) and ecosystem health (ecosystem vulnerability, biodiversity) within the river basin and the impacts this might have on companies, society, and the environment.	» Strength and enforcement of water regulations and the consequences of restrictions by public institutions. Either felt through direct regulatory action or from neglect, blockages, or failure. » Potential for conflict or political disagreement over transboundary river basins, or national political imperatives, such as trade restrictions on food crops with embedded water.	» Perceptions around water use, pollution, and behaviour that may have negative impacts on the company brand and influence purchasing decisions. » Public perceptions can emerge rapidly when local aquatic systems and community access to water are affected.
Company-related risk (linked to behaviour)	» Water quantity and quality issues related to a company's performance and its supply chain.	» The potential changes in pricing of water supply and waste water discharge, water rights, quality standards and license to operate for a particular company or sector. » Particularly in times of crisis (induced by physical risk) when regulatory regimes are changed unpredictably or incoherently, or they are inconsistently applied due to political expedience, incompetence or corruption.	» When the actions of the company are poorly executed, understood, or communicated to local stakeholders and when perceptions and brand suffer as a consequence.

Table 1. A general overview of water-related risks for companies

German companies from various economic sectors are linked to many different locations throughout the world. As a first step, German companies must better understand their water risks in order to properly recognise their particular risk exposure. This understanding is vital when seeking to reduce risks linked to their production. The Water Risk Filter (see Side Note 1), developed by WWF and the German development bank DEG, provides one approach for analysing a company's water risks in a certain geographical region.

Side Note 1: The Water Risk Filter (WWF/DEG)
The Water Risk Filter is the first tool to quantify water-related risk for all industries in all countries. 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 developing location specific water risk reducion measures.This ultimately improves water management at a company level and water stewardship at a basin level.

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



A sample Water Risk Assessment for a company
For more information visit http://waterriskfilter.panda.org/

Water footprint

Each company also has a so-called "water footprint", which is the total amount of water consumed when producing a good related to direct operations or supply chains (see Side Note 2).

The Water Risk Filter provides one approach for analysing a company's water risks in a certain geographical region.

The difference between water footprint and water risk is important because the amount of water used does not necessarily indicate high risk. For example, risk may evolve even if a company is using a small amount of water but is located in an area with a highly unreliable water supply, or is located in an area where water is plentiful but risk remains high because of poor governance. If a company is focused on reducing its footprint without looking at risk, it may succeed in becoming more efficient while still failing to reduce risk.

Side Note 2: Water footprint
A product's water footprint is the volume of freshwater used to produce product goods or commodities, taking into account the volumes of water consumed and polluted in different steps of the supply chain. A distinction is made between[18]:
Blue water footprint – volume of surface and groundwater consumed as a result of the production of a good or service
Green water footprint – volume of rainwater consumed during the production process
Grey water footprint – an indicator of freshwater pollution that can be associated with the production of a product over its entire supply chain

Direct water use refers to the volume of freshwater consumed by a consumer for concrete activities (e.g. cooking or washing) or by a business within a local production process. Indirect water use refers to the volume of freshwater that is embedded in goods that were produced and imported from different regions, such as food, paper, cotton clothes, or in the case of businesses, products from earlier stages of the supply chain.

A company's water footprint is the cumulative water needed to function; however, few, companies have estimated how much water they will need to grow. In 2009, WWF Germany calculated the water footprint of the German economy and found that the goods and commodities consumed daily have the largest water footprint. A German citizen consumes around 5,200 litres of water each day, of which only 120 litres are consumed directly (e.g. in the household)[19].

Water footprints of products we use daily:
1 t-shirt = 2,500 litres
1 cup of coffee = 130 litres
1 apple = 125 litres
1 litre ethanol (from sugar cane) = 2,107 litres
1 microchip = 30 litres

The water footprint is important in raising awareness, informing purchase decisions, and improving water use efficiency.

For further information and data source: http://www.waterfootprint.org

2.4 The Water Future of German Companies

Germany itself has a very fortunate water situation. However, the German economy relies on goods and services imported from other countries.

In 2008, Germany was the world's leading export country; in 2012, it was the third largest exporter with a global export value of €1,107,938 million (US$1,407,082 million) – after China and the USA[20]. **In 2012, Germany was also the world's third biggest importing country with €919,083.7 million (US$1,167,236.3 million) of merchandise value[21].**

Germany itself has a very fortunate water situation. In comparison with other countries, sufficient water availability, good water quality, a strong regulatory framework and governmental enforcement, and past and future investments in water structures reduces the water risks of production in Germany.

However, the German economy relies on goods and services imported from other countries – whether textiles and apparel, agricultural products, energy, or raw materials. The majority of these goods originate in locations with water scarcity, deteriorating water quality, weak governance and regulatory challenges, poor infrastructure, vulnerable communities, and fragile ecosystems.

A company that has a factory in or that sources materials from a poorly managed river basin may find itself facing a range of water-related risks like absolute water scarcity, increased water cost or regulation, or reputational damage caused by the real or perceived water-related impacts of its operations on communities and habitats[22].

Are you prepared for tomorrow? A brainstorm of possible future water scenarios*
Scenario 1: Shrinking glaciers of the Tibetan Plateau have dried up the Yellow River. One summer, the river dries up for 600 km inland. Because of global supply shortages, profits of German companies, which rely on importing processed food, footwear, and apparel, are directly affected.

Scenario 2: Over the course of a few years, groundwater in northern India becomes heavily overexploited. After eliminating pumping subsidies, the Indian government decides on a full ban of groundwater extraction for industries because they fear social upheaval. German businesses with their own factories in India would have to temporarily close their local factories and those operating through third parties will suddenly have to find an alternative sourcing solution.

Scenario 3: As a result of a local water crisis, the local civil society initiates extensive protests on problems related to water, including blaming international companies operating in their watershed. German society and media become aware of the upheaval and apply significant pressure to the companies to demonstrate that they are acting responsibly.

*These scenarios are purely intended as a brainstorming exercise of possible situations that could arise in the future, but should not be interpreted as definite.

"The key message for companies to understand is that water risks are experienced firstly and predominantly by people and ecosystems at the local/river basin scale. So any successful risk management approach must be based on finding solutions that work for the business and for local water users."

Lloyd's (2010), Global Water Scarcity - Risks and challenges for business

Stewardship vs. efficiency or supply chain shift

Many river basins around the world are currently under water stress and their numbers will rapidly increase in the future. If companies operate in water-stressed basins, conflicts can arise over the allocation of water resources between households, agriculture, industries, and other stakeholders. Depending on local dynamics, governments may make decisions that put a company's legal and social license to operate at risk. Social upheaval potentially puts a company's reputation at risk.

Simply shifting supply chains to locations with low water risks will not be the solution in the medium term. Increasing resource scarcity (water, land, energy), limitations in possible production locations and global trends such as population grwoth, climate change, changing consumption and increasing consumer demand for sustainbly managed products will make simple supply chain shifts difficult in the future.

If companies want to manage their risks and keep their operations and supply chains productive, they have to invest in the sustainable management of shared water resources. Companies that limit themselves to efficiency measures (internal water quantity and quality) will have to understand that this does not necessarily reduce their water risks. It will be crucial for those driving Germany's economy to think beyond a given factory, industry, or border. Approaches to reducing a company's water risks are clearly heading towards water stewardship solutions.

Germany is the world's third biggest import nation. The economy heavily depends on products from abroad. Simply shifting supply chains to low risk locations will no longer be an option.

3 Understanding Germany's Water Risk

This current study builds on WWF's 2009 Water Footprint of Germany study and an analysis of Germany's economic sectors using the WWF Water Risk Filter. The goal is to demonstrate how water risk is linked with Germany's leading sectors and their imports. Through this, decision-makers will be able to better understand water risks and develop solutions for risk mitigation.

3.1 Water Risk Analysis and Methodology

The methodology used to identify relevant import industry sectors and relevant countries of origin consisted of three major steps, which are illustrated in Figure 1. In each step, several variables were used to determine Germany's top water risk sectors.

To identify relevant economic sectors and their top ten countries of import origin, 2012 baseline import data (economic sectors, import country of origin, import value and import volume) from Germany's Federal Statistical Office[A, B] was initially analysed.

Basin-related risk results are based on 19 location-specific risk indicators within a framework of physical, regulatory, and reputational water risk categories.

In the second step, relevant economic sectors and import country information was analysed with the WWF Water Risk Filter[C], which assesses business-related water risks for 32 sectors and produced results consisting of two parts – basin- and facility-related risks. Basin-related risk results are based on 19 location-specific risk indicators within a framework of physical, regulatory, and reputational water risk categories. The facility-related risk assessment follows the same framework as the basin-related assessment. It consists of a questionnaire that focuses on a facility's direct operations as well as automatically assigned general industry-level information on water intensity and pollution related to the sector chosen for the assessment. Only the general sector information was used in this study to provide information on the sector of interest.

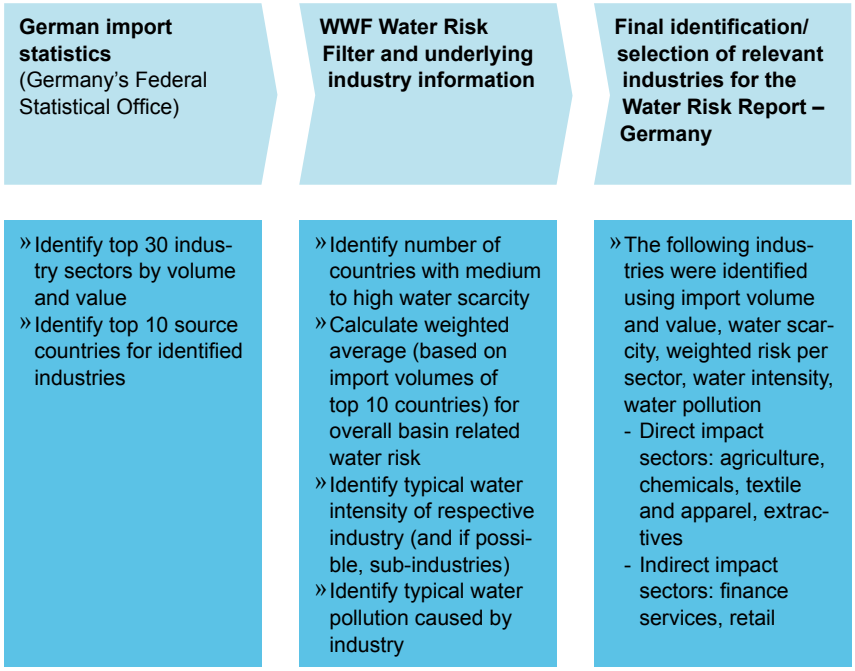
Depending on the industry and in order to account for industry-specific water risk exposure, the risk weightings vary between different risk categories (physical, regulatory, reputational). All weightings per industry can be found on the Water Risk Filter's website[D]. Risk scores varied between 1 (no/low risk) and 5 (very high risk)[E]. In order to define a final risk value, each countries maximum physical water risk (scarcity) and the overall industry specific risk were identified and calculated against the weighted average by import volume (tonnes) of the top 10 importing countries. For example, if a sector's top importing country by volume represents 80% of the top ten countries' import volume, its risk score has an 80% weighting within the top ten average to calculate the industry specific basin risk.

In the third step, four variables – medium and high water scarcity countries, weighted average of basin-related water risk, typical water intensity, and typical water pollution – identified with the WWF Water Risk Filter framework were used to select relevant direct impact industries and their respective source countries.

A In general: Foreign trade statistics GP2009-30 (2-Steller) – code: 51000-0007, year 2012
B For agriculture: Warenzollnummer (8-Steller), 2012
C www.waterriskfilter.org
D see: http://waterriskfilter.panda.org/en/Assessment#WaterRiskAssessmentTab/facility/992
E Categories: Low Risk = 1 – 2.249; Medium Risk = 2.25 – 3.49; High Risk = 3.5 – 5

As a result, four economic sectors with direct water risks (agriculture, chemical, textiles & apparel, and extractives) and two sectors with indirect water risks (financial services and retail) were selected and are presented below in more detail (see Annex for complete water risk data).

Figure 1. Methodological steps to identify Germany's economic sectors with potential water risks.



Side Note 3: Key methodological issues

How the data reflects re-exports

For all sectors presented, top import countries may include countries that are not the origin of the respective good or commodity. In these cases, a country imports goods and then re-exports them without further processing. For example, the Netherlands is a major re-exporter for the EU, which is seen in the textiles, mineral, agriculture, and chemical sectors.

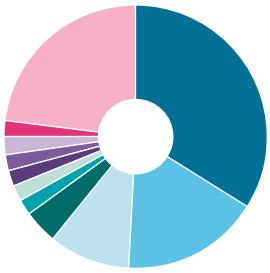
Risk score differences

Possible differences in risk scores related to regulatory risks between EU countries are based on results of the indicators (such as enforcement of regulation) found in the Water Risk Filter.

The Water Risk Filter Tool

Detailed information about the risk categories, data sets, and the weightings used to assess data in this report with the Water Risk Filter online tool can be found at www.waterriskfilter.org. The underlying water risk assessment methodology and respective data sets are regularly reviewed and updated to provide the user with the best and most current information available. The methodology has been tested by various organisations from the corporate, public, and financial sector to ensure coverage of all relevant water issues (represented through identified individual risk indicators within the physical, regulatory, and reputational risk categories), which can bear financial risk to a company's operation.

Figure 2. Overview of countries from which Germany imports apparel (based on tonnes imported).



China	34%
Bangladesh	17%
Turkey	10%
India	4%
Pakistan	2%
Netherlands	2%
Cambodia	2%
Indonesia	2%
Vietnam	2%
Italy	2%
Remaining (102 countries)	23%

3.2 Sectoral Analysis

Sectoral and basin specific water risks associated with Germany's 2012 foreign trade data lead to the identification of six economic sectors – textiles & apparel, extractives (including oil, gas, coal, mining), agriculture (plant), chemicals, retail, and financial services – described below. For each of the sectors, the water risks (physical, regulatory, and reputational) are presented.

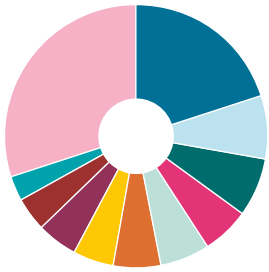
3.2.1 Textiles and Apparel

In 2011, textiles and apparel manufacturing accounted for €555.91 billion (US$706 billion) in global exports, representing 4% of world trade in merchandise and 6% of world trade in manufactured goods. The World Trade Organization reports that compound annual growth in apparel and textiles exports averaged 5.5% worldwide for the decade ending in 2010. Vietnam, China, Bangladesh, Turkey, and India were among the fastest growing nations during this period[23]. Importing €35.75 billion (US$45.4 billion) worth of textiles and apparel, Germany represents 6.4% of the global trade in these commodities.

Top countries of import to Germany and their water risk

Regarding import volume and value, Germany imports the most textiles and apparel from China (see Figure 2, Figure 3 and Table 2, Table 3). See Side Note 3 about the issue of re-exports.

Figure 3. Overview of countries from which Germany imports textiles (based on tonnes imported).



China	20%
Turkey	8%
India	7%
Italy	6%
Netherlands	6%
Belgium	6%
Poland	5%
Czech Rep.	5%
Austria	4%
Pakistan	3%
Remaining (132 countries)	30%

Country	Import value (€ m)	Import volume (t)	Physical risk	Regulatory risk	Reputational risk
China	8,018,707	396,341			
Turkey	3,063,985	112,439			
Bangladesh	2,917,409	204,948			
India	1,074,751	43,940			
Italy	1,046,574	20,975			
Netherlands	817,241	29,032			
Vietnam	607,912	23,644			
Indonesia	550,462	23,815			
Romania	539,117	12,860			
France	484,395	19,673			

Table 2. Top ten countries from which Germany imports apparel and their water risk (based on import value) High Medium Low

*See 3.1 Water Risk Analysis and Methodology for further details.

Country	Import value (€ m)	Import volume (t)	Physical risk	Regu-latory risk	Reputa-tional risk
China	1,791,384	317,829			
Italy	971,749	105,784			
Turkey	771,609	132,373			
Netherlands	521,336	101,259			
Poland	517,505	88,071			
India	466,037	106,594			
Switzerland	414,178	25,893			
Belgium	407,814	100,285			
Czech Rep.	398,921	81,765			
Austria	341,019	38,191			

Table 3. Top ten countries from which Germany imports textiles and their water risk (based on import value) High Medium Low

*See 3.1 Water Risk Analysis and Methodology for further details.

Cotton production is the most water-intense segment of the value chain for the textiles and apparel sector and is also the segment most vulnerable to climate-induced physical water risks.

Sector water risk and water intensity

Water-related risks are significant in textiles and apparel production (see Table 4). There are strong links to agriculture and the petrochemical industry, both of which are big water users and polluters. The textile industry is second only to agriculture as the world's biggest water polluter[24]. Each year, mills discharge millions of litres of wastewater containing toxic chemicals, such as formaldehyde, chlorine, and heavy metals, like lead and mercury. Many of these chemicals cannot be filtered or removed and cause both environmental damage and human disease[25]. Cotton production is the most water-intense segment of the value chain for the textiles and apparel sector and is also the segment most vulnerable to climate-induced physical water risks.

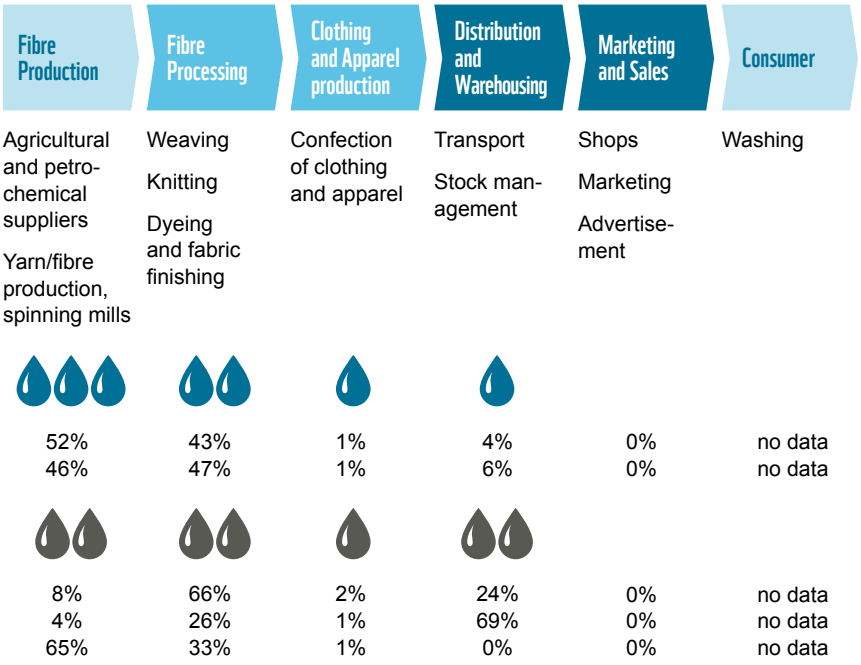
The impacts of water risk on a textile company's performance can be illustrated through H&M's lower profits after having to absorb skyrocketed cotton prices due to flooding in major cotton growing areas in Pakistan, Australia, and China that limited supply in 2011[26, 27].

Cotton water facts[28, 29]
Water consumption in cotton production differs between countries: China (6,000 litres/kg), India (22,500 litres/kg), Pakistan (9,600 litres/kg), and Uzbekistan (9,200 litres/kg).
Pesticides and herbicides used to grow conventional cotton account for 10% of all agricultural chemicals and 25% of all pesticides used worldwide each year.
The World Bank estimates that textile dyeing and treatment causes 20% of global industrial water pollution.

Figure 4. General value chain of the textiles and apparel sector and associated water intensity and pollution.

Key value chain step ■

May be operated by textile and apparel company in case of vertical integration ■

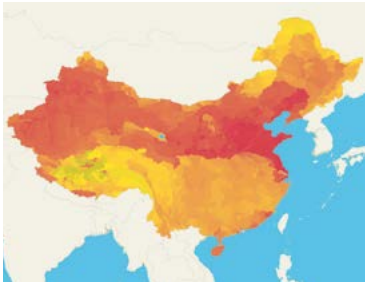


Textile/Apparel production requires a lot of water, often within water scarce countries. Especially growing the cotton and dyeing the fabric are water intensive steps in the supply chain.

	Physical risk	Regulatory risk	Reputational risk
Risks that can be influenced by a company	» High reliance on large freshwater volumes, especially for agricultural suppliers, petrochemical suppliers, and wet processing of textile (dyeing and bleaching) » Large amounts of often very polluted wastewater are discharged directly, often without treatment - High amounts of pesticides and insecticides used for agricultural supplies, especially cotton - High amounts of chemicals needed to process agricultural inputs, produce synthetic fibres, and for textile wet processing	» Regulators are well aware of environmental and public health issues of textile processing and regulation is often strict - Enforcement is often very limited, but this is likely to increase - Many companies have been forced out of business by local governments - Regulation of agricultural production is often less strict, while water depletion and pollution is common	» Local residents are well aware of the industry's negative impact on ecosystems and public health - Often, freshwater sources are polluted or depleted, which results in a lack of clean drinking water - Emerging health issues cannot be ignored - Locals sometimes keep track of abuses » Customers and NGOs are paying more attention to water risks - Focus is mainly on well-known international brands. These brands will define more standards and policies that suppliers need to follow
Risks that can be influenced by basin stakeholders	» Freshwater availability under pressure due to increasing demand from other basin users - Large need for water is depleting surface and / or groundwater reserves - Textile industry is often geographically concentrated » Basin often so polluted that water insufficiently cleaned for use » Soil erosion is common where cotton is grown	» Regulation should be strict to avoid negative impact on the competitive position - No or limited regulation or no or limited enforcement by local governments can impact water quantity and quality in the basin - If operating in a multi-national basin, differences in regulations and enforcement per country can have greater impact on water quantity and quality downstream	» As textile suppliers tend to be concentrated, the reputation of every company operating in the same basin is under pressure if the basin is under threat

Table 4. A general overview of water-related risks for the textiles and apparel sector

Country case: China – textiles & apparel



	Share of global exports[30]	Share of imports to Germany
Textiles	32%	19.6%
Apparel	37%	33.8%

Traditionally a pillar industry for China's economy, textile production accounts for over 40% of its industrial output[31]. China accounted for 34% of the world's textiles exports worth €157.48 billion (US$200 billion) in 2010[32].

Water situation

While 20% of the world's population resides in China, the country only has 7% of the planet's freshwater reserves[33]. China can be divided into nine main river basin groups, yet approximately 80% of the country's renewable surface water resources are in the south. To balance this unequal distribution, a huge water diversion project is underway to transfer water from the south to the north, which could potentially have serious environmental implications for the south.

The main water problems facing China are: groundwater overextraction and falling water tables (particularly in the north); pollution – 70% of China's rivers and lakes are significantly contaminated, 50% of China's cities have polluted groundwater, and over 30% of China is affected by acid rain[34]; and severe water stress – 44.7% of the country suffers from water stress[35]. Water shortages and droughts dampen China's economic development causing direct economic losses of €27.56 billion (US$35billion) annually[36]. Environmental pollution accidents occur frequently in China; almost half of the 1,400 accidents in 2005 involved water pollution[37].

Physical risks

The Chinese textiles industry uses three to four times more water in production than its counterparts in developed countries[38]. Industrial water use and discharge is one of the main causes of worsening water shortages and water pollution problems in addition to toxic groceries and aquatic products[39]. In China, the textiles industry is one of the biggest water polluters. While the cutting and sewing production steps of apparel production have increasingly been moved to other parts of Asia, China retains the leading position in the wet processing sectors, like dyeing and finishing[40]. Wastewater from the dyeing and finishing segment accounts for 80% of total wastewater in the manufacturing supply chain[41].

In China, the textiles industry is one of the biggest water polluters.

Both Xinjiang, China's most important cotton-growing area in the northwest, and eastern regions where cotton is also grown are experiencing water stress.

Regulatory risks

The regulatory landscape varies within China's different regions, which requires companies to pay close attention to both local and national regulations. Responsibilities for water resources, data and information, infrastructure construction, environmental protection, agricultural development, transportation, and other water-related activities are split among competing and conflicting institutions[42].

With the introduction of the "Law on the Prevention and Control of Water Pollution" in 1984 (revised in 2008) and the Water Law in 2002, China established regulatory control to prevent and control freshwater pollution and water resource use. Some of the Water Law's provisions allow for tougher penalties on polluters, a discharge permitting system, citizens to bring class action suits against polluters, improved standards, and increased transparency and penalties for inadequate government enforcement[43].

Historically for companies in China, it has been more profitable to pay pollution fines rather than implement prevention measures to the point that some companies incorporate such expenditures into their budgets. However, recent amendments to the Water Pollution Prevention Control Law have raised financial penalties on polluters with no maximum limit specified for serious incidents[44].

Addressing China's water problems has been hampered by local government efforts to protect local industries and jobs, government corruption, the desire to sustain rapid economic growth, and the national environmental regulatory body, the State Environmental Protection Administration (SEPA)'s "crippling weakness"[45]. It is currently rumoured that the 1989 Environmental Protection Law is being revised to place more emphasis on the environment as a consequence of China's environmental degradation[46].

There were an estimated 187,000 environmental protests in 2012, which is an average of 500 protests a day.

Reputational risks

Chinese citizens are increasingly aware of environmental issues, and activism against water pollution is increasing. There were an estimated 187,000 environmental protests in 2012, which is an average of 500 protests a day[47].

In 2012, Greenpeace published the report "Toxic Threads", exposing water pollution by China's textile industry. In 2011, a group of Chinese NGOs launched China Water Risk, which is a non-profit initiative providing information on water risks for businesses.

In China, 80% of wastewater in textile production comes from the dyeing processing.

Country case: Bangladesh – textiles & apparel

	Share of global exports[48]	Share of imports to Germany
Textiles	0.5%	1%
Apparel	4.8%	17.5%

In just under one decade, Bangladesh has emerged as the twelfth largest garment-manufacturing nation in the world[49]. Bangladesh's textiles sector contributes nearly 79% of export earnings and employs 3.6 million people[50]. The growth of the country's manufacturing sector is predicted to grow in the future as minimal wages make purchasing in Bangladesh attractive for apparel brands[51]. Production is concentrated around Dhaka.

Water situation

Bangladesh lies in the world's largest estuary delta made up of the Ganges, Brahmaputra, and Meghna (GBM) rivers. Only 7% of the GBM system's total catchment lies in Bangladesh. Most rivers in Bangladesh are tributaries or distributaries to the GBM river systems. The water regime of the GBM river systems is marked by a great disparity between monsoon floods and the low flow during the dry season. Climate change has altered the frequency and intensity of the monsoons and is causing rapid snowmelt in the Himalayas, the source of two of Bangladesh's three major waterways. This will also entail freshwater shortages in the future, as India and China will increase damming upstream in response to their own water and energy shortages[52]. Bangladesh is also faced with groundwater contamination due to naturally occurring arsenic, resulting in unsafe drinking water, and permanent depletion of groundwater levels, particularly in the Dhaka metropolitan area and northwest[53, 54].

With over 1,700 washing, dyeing, and finishing units consuming 1,500 billion litres of groundwater annually and discharging wastewater, the sector impacts the lives of Dhaka's 12 million inhabitants.

Physical risks

The apparel industry is adding to Bangladesh's water problems. With over 1,700 washing, dyeing, and finishing units consuming 1,500 billion litres of groundwater annually and discharging wastewater, the sector impacts the lives of Dhaka's 12 million inhabitants[55].

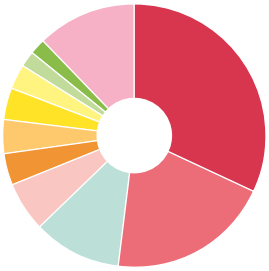
Regulatory risks

Bangladesh's apparel industry has largely gone unchallenged by government, which has been reluctant to regulate. However, this is changing due to public pressure to implement and enforce strict regulations after serious accidents in textile factories in 2012 and 2013 (see reputational risks below).

Reputational risks

The textile industry in Bangladesh has been under close scrutiny since serious regulatory lapses were confirmed after a fire in a textile factory in Dhaka that killed 117 people in November 2012 and the devastating collapse of a garment factory building in Savar in April 2013 in which 1,129 people were killed. Consequently, public awareness about problems related to this sector is growing (also in the field of water).

Figure 5. Overview of countries from which Germany imports oil, gas, and coal (based on tonnes imported)



Russia	32%
Norway	20%
Netherlands	11%
UK	6%
USA	4%
Colombia	4%
Libya	4%
Nigeria	3%
Kazakhstan	2%
Australia	2%
Remaining (37 countries)	12%

3.2.2 Extractives

Oil and gas are vital to many industries and civilisation as a whole. In 2011, the world consumed approximately 4,060 million tonnes of oil. Developed nations are the largest consumers – North America and Europe/Eurasia respectively consumed 25.3% and 22.1% of the oil produced in 2011[56]. Altogether, petroleum production, distribution, refining, and retailing represents the world's largest industry in terms of dollar value.

Top countries of import to Germany and their water risk

In 2011, fuels and mining made up 22.5% of the total world trade in merchandise[57, F]. In 2012, Germany imported €110 billion (US$139.7 billion) worth of extractive goods and resources (mineral oil, gas, coal, and ore) and consumed 2.7% of the oil and 2.2% of the natural gas produced in 2011[G]. Germany mainly imports its oil, gas, and coal from Russia, followed by Norway, the Netherlands, and the UK (see Table 5 and Figure 5). Germany's ores are mainly imported from Brazil (see Table 6 and Figure 6). See Side Note 3 about the issue of re-exports.

Country	Import value (€ m)	Import volume (t)	Physical risk	Regulatory risk	Reputational risk
Russia	32,829,331	72,529,771			
Norway	22,477,247	46,741,204			
Netherlands	11,723,085	25,623,804			
UK	7,258,692	14,180,493			
Libya	5,449,903	8,089,927			
Nigeria	4,281,702	6,481,509			
Kazakhstan	3,520,847	5,160,972			
Algeria	1,506,394	2,200,190			
Azerbaijan	1,449,772	2,170,780			
Saudi Arabia	1,192,858	1,973,588			

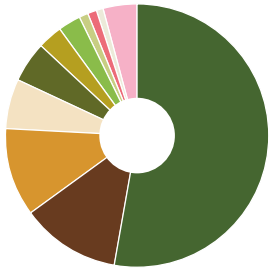
Table 5. Top ten countries from which Germany imports oil/gas/coal and their water risk (based on import value). The import value and volume and water risk scores are aggregated from individual commodities (see Annex 1 for individual commodities). High Medium Low

*See 3.1 Water Risk Analysis and Methodology for further details.

F The WTO's definition of fuels and mining products includes, apart from the commodities included in the German trade numbers, non-crude petroleum oils, coke and briquettes, electric current, crude fertilisers and metal scrap. These made up around 7% of world trade in 2011, 5% being non-crude petroleum oils. Source: WTO Trade Statistics 2011, UN Comtrade

G BP, 2012

Figure 6. Overview of countries from which Germany imports ore (based on tonnes imported)



Brazil	53%
Sweden	12%
Canada	11%
South Africa	6%
Guinea	5%
Mauritania	3%
Australia	3%
Argentina	1%
Norway	1%
Peru	1%
Remaining (64 countries)	12%

Country	Import value (€ m)	Import volume (t)	Physical risk	Regulatory risk	Reputational risk
Brazil	2,746,074	23,119,169			
Canada	771,482	4,541,891			
Sweden	731,446	5,153,571			
South Africa	713,097	2,778,054			
Peru	707,789	382,717			
Australia	544,449	1,219,735			
Argentina	473,095	571,610			
Chile	387,036	255,800			
Mauretania	133,798	1,253,371			
Papua New Guinea	123,892	43,281			

Table 6. Top ten countries from which Germany imports ore and their water risk (based on imported value) High Medium Low

*See 3.1 Water Risk Analysis and Methodology for further details.

Sector water risk and water intensity

Mining, oil, and gas exploration operations cannot be relocated since they are dependent on the specific location of the ore, oil, gas or coal, which makes the sector susceptible to changing local water availability and quality and to community concerns about water use[58].

The extractives industry has historically had a significant impact on ecosystems in which they operate. Extractive operations use and often degrade the quality of significant quantities of water. The fact that mining, oil, and gas companies are often situated in areas where water is already scarce and quality is under pressure only exacerbates these problems further[59].

Unconventional sources, such as shale gas production, are currently being intensively explored in a number of countries from which Germany imports natural gas, such as the Netherlands and the United Kingdom. Next to water use, the risks associated with the extraction of shale gas through hydraulic fracturing are chemical ground contamination and underregulation by authorities.

Oil & gas	Coal & ore mining
Oil and gas explorations use large amounts of water for well drilling, site development, and fracturing. Water contamination is a significant risk when oil and gas operations intersect with drinking water supplies, or is transported via long pipelines, which are difficult to monitor, in the case of uncontrolled spills or wastewater discharge or through unconventional forms of natural gas extraction, like coal-bed methane, oil sands, and shale gas. Pumping oil and gas out of the ground produces large volumes of low-quality water known as "produced water." The movement and disposal of this heavily polluted water is a part of the debate on the environmental impact of oil and gas extraction. Oil refineries are often situated near navigable rivers, lakes, or seaports for transport reasons. Low water levels increase costs for shipping oil and gas.	Many mining operations extract ore from below the water table, which can affect local hydrology and ecosystems. Acid runoff affects water quality by reducing pH levels and increasing concentrations of toxic or heavy metals like copper, lead, and mercury in mine drainage water. Spills of coal sludge or cyanide can severely affect freshwater resources. Closed mines can pose long-term environmental liabilities as they must be pumped and treated indefinitely to prevent contamination of surface and ground water.

Figure 7. Extractives sector impacts on water[60]

Extractive industries are often considered strategic national industries with privileged access to government, but their negative impacts on local water resources can bring political heat and therefore increase pressure on water rights and prices and on the license to operate. Recent oil spills, such as the 2010 Deepwater Horizon accident, contribute to the global oil industry's negative image and have forced the industry to reconsider its security and environmental policies.

Water facts and the extractives sector

- To refine 1 litre of oil, 2.5 litres of water are needed for processing and cooling.
- To separate each litre of oil from tar sands, 4–5 litres of water are needed.
- To drill and fracture a typical shale gas well (depending on the basin and geological formation), 20 million litres of water are required[61].
- To extract 1 kilogram of ore (depending on the ore type), 0.1–80 litres of water are needed.
- The estimated cost to clean up polluted drainage from years of coal mining in West Virginia is €4–12 billion.

To separate each litre of oil from tar sands, 4-5 litres of water are needed.

Figure 8. General value chain of the oil & gas sector and associated water intensity and pollution

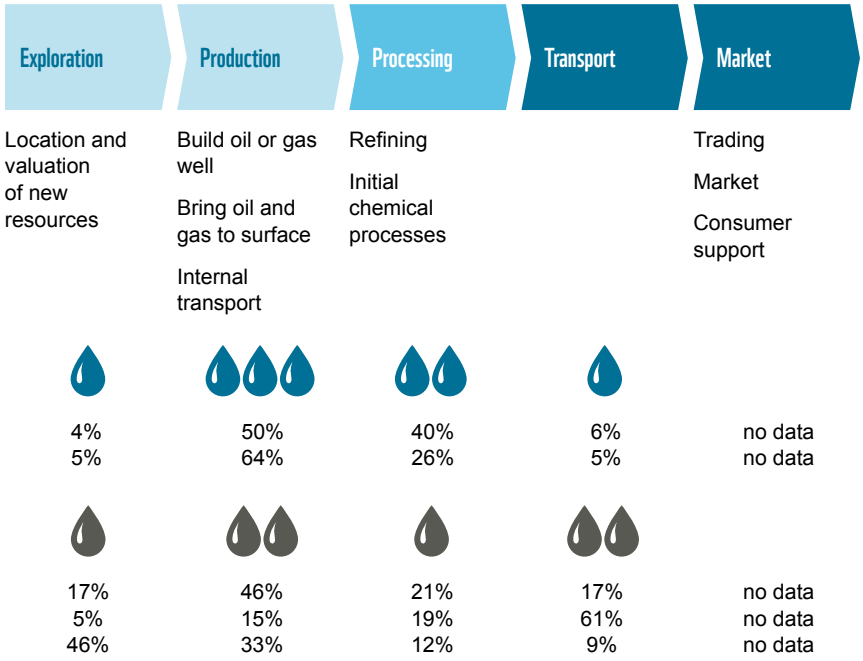
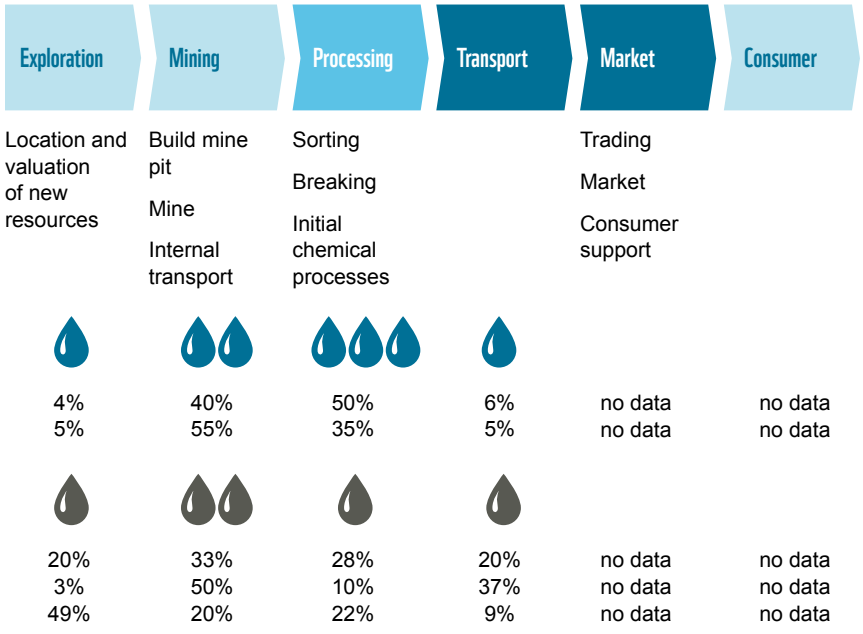


Figure 9. General value chain of the mining sector and associated water intensity and pollution



	Physical risk	Regulatory risk	Reputational risk
Risks that can be influenced by a company	» High reliance on large freshwater volumes. Mining and drilling cannot be relocated in case of water scarcity - Mining and drilling is often in remote areas (including ocean platforms) with limited access to freshwater - Groundwater sources may be depleted if recharge is insufficient - Intensive desalination results in pollution - Oil sands and shale gas are especially water-intensive » Disruption of operations due to extreme weather events like severe rain fall or flooding due to climate change	» Governments increasingly responsive to community demands to reject new mining/oil projects » Increasing competition with other water users in the basin may lead to withdrawal of water rights » Stricter regulation and increased enforcement by governments may increase cost for freshwater and wastewater treatment and discharge - Lawmakers may force companies to use innovative production technologies to reduce impact on water - Significant impact on potential price considering the required volumes	» Oil spills have a highly negative impact on reputation » Stakeholders (governments, communities, NGOs, and companies looking at their own supply chain footprint) increasingly concerned with the high amount of toxic wastewater and mine drainage that may have negative impacts on water resources and surrounding ecosystems » Potential depletion of the freshwater source, which may impact all stakeholders in the basin » Reputational damage can directly impact sales of oil and gas companies since they are often vertically integrated and sell directly to end users » Direct reputational damage is limited for the mining industry, as most companies do not sell directly to end users
Risks that can be influenced by basin stakeholders	» Freshwater availability (quantity) under pressure due to increasing demand from other basin users - e.g. in remote areas where agriculture can only develop with irrigation » Other basin users may pollute freshwater sources (quality) » Increasing air and water temperatures imply increasing amount of water needed for cooling and operation, while evaporation of water sources is increasing	» Large multinationals are often easy targets for (local) governments - Local companies often favoured over large multinationals for e.g. taxes and regulation » No/limited regulation or no/limited enforcement by local governments can impact water quantity and quality » If operating in a multi-national basin, differences in regulations and enforcement per country can have greater impact on water quantity and quality downstream	» Reputational risk, especially for large multinationals, is high in case of local water scarcity or wastewater pollution in the basin that the company operates in. This is even the case if the company follows best practice in water use and sewage and water rights have been purchased properly » End user (consumer) pressure not to buy raw ore/oil/gas from mines and wells in troubled basins

Table 7. A general overview of water-related risks for the extractives sector

Country case: Russia – oil, gas, coal

	Share of global production[62]	Share of imports to Germany
Oil	12.8%	37.3%
Natural gas	18.5%	28.9%
Coal	4%	25.7%

Russia is the fifth largest economy in the world and is a leading exporter of oil and natural gas. Mining contributed 11% to Russia's GDP in 2013[63]. Russia's gas output is expected to grow as Russia holds 21.4% of the world's proven natural gas reserves. Although Russia only produces 4% of the world's coal, it is the world's third largest coal exporter and the primary source of coal imported to Germany. Over half of Russian coal is mined in Kuzbass, Southern Siberia, which is also the main source of coal exported to Germany[64].

Water situation

Most of Russia's freshwater resources, which are contained in the permafrost covering the northern part of European Russia, most of Siberia, and almost the entire far-east region, are of no practical use. The majority of Russia's total annual renewable surface water resources, estimated at 4,222.24 km^3, are generated internally; however, resources are unevenly distributed across the country. The central and southern regions of European Russia, where 80% of the country's population and industry is concentrated, have only around 9% of surface and groundwater resources[65]. In the 1990s, after decades of environmental neglect, the government categorised about 40% of Russia's territory as under high or moderately high ecological stress[66]. The worst drinking water quality is found in the north and northwest of the country, especially in areas where oil and chemical industries are located[67].

The government categorised about 40% of Russia's territory as under high or moderately high ecological stress.

Physical risk

Since oil production does not depend on unpolluted water resources, the Russian oil industry's risk arising from water pollution is mainly reputational (see below). Environmental pollution by wastewater effluents and oil spills will, however, have direct financial implications for oil companies if they have to assume their environmental costs.

Regulatory risk

Russian environmental law has been deemed ill-equipped to handle the inevitable accidents that are associated with the oil industry[68]. Enforcement of environmental regulations has historically been weak in Russia, but a survey from 2011 reveals concerns within the oil and gas industry over future regulation as the government seeks to close a budget gap with the help of oil and gas industry revenues[69].

Reputational risk

The reputational risks for the extractives industry in Russia are enormous. In 2013, Greenpeace activists were arrested for protesting against Arctic oil drilling, which sparked international media attention and public support. Ongoing severe environmental problems caused by the Russian oil industry continue to threaten its reputation:

» Each year, 200 million tonnes of water are pumped out of Russian coal mines. A 2011 report estimates wastewater pollutant discharges at over 0.5 million cubic meters a year for the Kemerovo region, which lies near Kuzbass. According to the report, the region's water quality in the rivers flowing through industrial areas is "polluted," "very polluted," and in certain cases, "extremely polluted"[70].

Tailings contain large quantities of acid, which infiltrate waterways and aquifers.

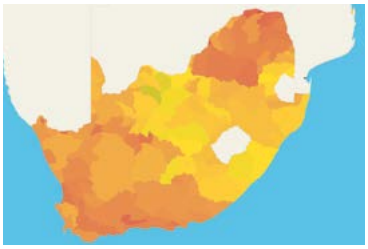
» Tailings dumps (the materials left over after separating the valuable fraction from the uneconomic fraction of an ore) contain large quantities of acid, which infiltrate waterways and aquifers, becoming another source of pollution contaminating drinking water supplies. Acid rains also cause leaching of metals from the tailings, rock refuse, clinker, with metals making their way into rivers, lakes, and seas[71].

» Extreme weather conditions coupled with a lack of maintenance have resulted in slow but constant seepage of oil from pipeline ruptures. In oil development areas, spilled oil forms toxic lakes, penetrates the soil, and seeps into the groundwater[72]. According to Greenpeace, 5 million tonnes of crude oil are spilled in Russian oil fields every year.

» Every year, rivers transport several hundred thousand tonnes of petroleum products. In the groundwater and drinking water of oil and gas fields in Western Siberia, concentrations of petroleum hydrocarbons, phenols, and other pollutants associated with oil and gas production reach concentrations as high as 10 to 35 times the maximum allowable concentration (MACs)[73].

Russia is the biggest exporter of oil, gas and coal to Germany. Oil and gas companies in Russia mainly face reputational water risks due to oil spills or other environmental accidents.

Country case: South Africa - ores (platinum, gold, coal)



Share of global production[74]: 80%
Share of imports to Germany: 6.4%

South Africa is one of the world's most important mining nations, holding the world's largest reserves of gold and platinum and also significant diamond and coal resources. South Africa exports around €75 billion (US$100 billion) worth of mineral resources annually[75]. In 2010, revenues from mining accounted for 9% of South Africa's GDP[76].

Water situation

South Africa's groundwater is limited due to the country's geology, and most of the country is underlain by low-yield secondary aquifers. In the northern parts of the country, both surface water and groundwater resources are nearly fully developed and used. By contrast, in the well-watered south-eastern regions, there is more potential to develop some new resources[77]. South Africa's major environmental problems are dams that require extensive water conservation and control measures; growth in water use outpacing supply; pollution of rivers from agricultural runoff and urban discharge; acid mine drainage; air pollution resulting in acid rain; soil erosion and desertification[78]. The most important river, the Vaal, is overutilised and necessitates transfers from the Tugela and the Orange Rivers[79].

In 2013, platinum producers were affected by water restrictions around the mining city of Rustenburg after a drought in the northwest province

Physical risks

The areas of current mining operations and planned future ones are situated in the most arid regions of the country[80]. Mining companies in South Africa have already felt the financially detrimental effects of risks like flooding and water stress[81]. In 2013, platinum producers were affected by water restrictions around the mining city of Rustenburg after a drought in the northwest province[82].

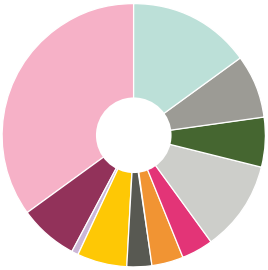
Acid mine drainage (AMD) is the largest environmental problem facing the mining industry in South Africa, particularly because it is persistent and costly and tends to be a liability for mines long after they cease to operate[83]. AMD arises when pyrite from gold, coal, or platinum deposits oxidises to produce sulphuric acid. The acidic water increases the solubility of aluminium and heavy metals present in the affected regions, rendering the water toxic as the dissolved metals leach into the water[84].

Regulatory risks

Mining and mineral development requires water use licenses (WUL) from the Department of Water Affairs (DWA). The DWA acts against polluters if they can be identified and some cases of industrial pollution have been taken to court[85]. The 1998 Water Act provides for stiff penalties if ineffective water use can be proven[86]. However, enforcement seems to be weak as over 50 mines in South Africa operate without valid WULs[87].

Rising water prices have prompted mining companies to invest in water-saving technologies[88]. Platinum mines in the Olifants face long-term risks associated with escalating water charges; future operations face water charges ten times higher than what is currently paid[89]. Should the Water Act be more strictly enforced in the future, mines will also face the cost of treating acid mine discharge before releasing it into the environment.

Figure 10. Overview of countries from which Germany imports agricultural products (based on tonnes imported)



Netherlands	15%
Spain	8%
Brazil	6%
France	11%
Italy	4%
USA	4%
Denmark	3%
Poland	6%
Vietnam	1%
Czech Rep.	2%
Remaining (166 countries)	12%

Reputational risks

Water-related reputational risks exist due to the severity of the problems caused by acid mine drainage. Water scarcity and competing water use in the Olifants have led to negative stakeholder perceptions around water for mining, which have impacted decisions on water allocation in the region. As a result and despite forfeiting economic benefits, agriculture has been favoured over mining[90].

3.2.3 Agriculture

Agricultural products made up 9.3% of total world trade in merchandise in 2011[91]. In 2011, Germany was the third largest importing country with €72.2 million (US$92.33 million) worth of agricultural products[92, 93].

Top countries of import to Germany and their water risk

Most of Germany's important agricultural trade partners are found within the EU; Brazil, the USA, and Vietnam are the most important non-EU import countries (see Figure 10)[94]. For the agricultural sector in particular, the issue of re-exports (see Side Note 3) is important to keep in mind. For example, the Netherlands is one of the main re-exporters to Germany of soy, oil palm, cacao, rice, pineapple, and citrus (see Table 8). When considering water risk for the agriculture sector, it is crucial to review the entire value chain and identify indirect water risks.

Commodity	Import value (in € m)	Import volume (tonnes)	Country	Physical risk	Regulatory risk	Reputational risk
Soy produce	2,950	7,001,724	Brazil			
			Netherlands			
			USA			
			Argentina			
			Paraguay			
Oil palm	1,451	2,128,763	Indonesia			
			Netherlands			
			Malaysia			
			New Guinea			
			Thailand			
Grape	3,149	2,081,176	Italy			
			Spain			
			France			
			South Africa			
			Chile			

Commodity	Import value (in € m)	Import volume (tonnes)	Country	Physical risk	Regulatory risk	Reputational risk
Coffee	4,188	1,261,228	Brazil			
			Vietnam			
			Honduras			
			Peru			
			Ethiopia			
Banana	729	1,182,907	Ecuador			
			Colombia			
			Costa Rica			
			DomRep			
			Peru			
Cocoa	3,204	1,167,886	Netherlands			
			Ivory Coast			
			Belgium			
			Indonesia			
			Ghana			
Rice	327	448,490	Italy			
			Netherlands			
			Belgium			
			Spain			
			India			
Pineapple	253	317,794	Costa Rica			
			Thailand			
			South Africa			
			Netherlands			
			Indonesia			
Sugarcane	130	312,415	India			
			Swaziland			
			Brazil			
			Denmark			
			Australia			
Citrus	350	298,054	Spain			
			China			
			Netherlands			
			Italy			
			Argentina			

Table 8. Selected top ten agricultural commodity water risks of import products to Germany
High Medium Low

*See 3.1 Water Risk Analysis and Methodology for further details.

Roughly 70% of the surface and ground water used globally is for agriculture[95], with as much as 90% of water dedicated to agriculture in developing countries[96]. Many of the world's croplands are in semi-arid areas that are expected to become even drier due to climate change.

Roughly 70% of the surface and ground water used globally is for agriculture.

A significant risk for the sector is the high water demand for irrigation, which is expected to be aggravated by growing competition from urbanisation, industrialisation, and climate change impacts. The latter is likely to affect water supply and agriculture through changes in the seasonal timing of rainfall and snow-pack melt, as well as higher incidence and severity of floods and droughts[97].

Between 15–35% of water use by agriculture is estimated to be unsustainable; additionally, agriculture wastes 60% of the water it uses each year[98]. Agriculture is the main cause of water pollution in many countries due to the discharge of pollutants and sediment to the surface and/or groundwater, net loss of soil by poor agricultural practices, and salinisation and waterlogging of irrigated land[99]. At the same time, the sector is dependent on good quality water resources in order to avoid contamination of crops.

Water risks related to agricultural production are comparatively low for commodities produced in Germany as the country has abundant water resources and relatively well-developed water resource management systems in place. However, German manufacturers and retailers could face significant water-related risks along their supply chains if agricultural raw materials are imported from regions experiencing water problems. Prominent examples are the food and beverage sectors that are heavily dependent on water for production of their input and final good, either as a direct ingredient or to process raw materials.

Global average water footprints of agricultural goods[H]:

Tomato:	200 l/kg
Oranges:	560 l/kg
Rice:	2,500 l/kg
Beef:	15,400 l/kg
Coffee:	15,900 l/kg

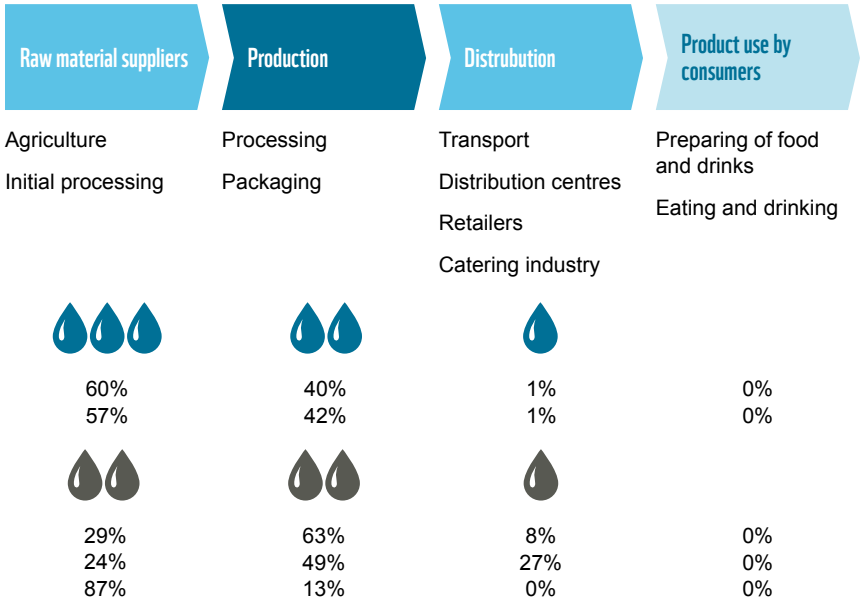
*Please see Side Note 2 for further information about the water footprint.

H www.waterfootprint.org

Figure 10. General value chain for the agriculture sector and associated water intensity and pollution

Key value chain step ■

May be operated by textile and apparel company in case of vertical integration ■

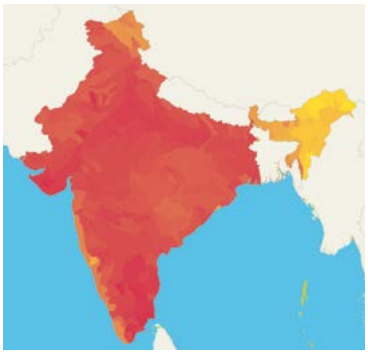


Agriculture accounts for 70% of water withdrawals globally. In some countries 70% of irrigation water is lost during the transport to the field.

	Physical risk	Regulatory risk	Reputational risk
Risks that can be influenced by a company	» High reliance on large freshwater volumes for direct use - Potable water is a principal and non-substitutable ingredient for beverage products. Water scarcity or contamination of water sources may force bottling or manufacturing facilities to shut down or relocate » The most significant water use is embedded in crop or livestock production (suppliers) - Changes in precipitation patterns and severe drought and flooding due to climate change may decrease crop yield and quality and raise water requirements for crops and livestock	» Increasing competition with other water users in the basin may lead to withdrawal of water rights » Stricter regulation and increased enforcement by governments may increase cost for freshwater and wastewater treatment and discharge - Lawmakers may force companies to use innovative production technologies to reduce impact on water - Impact of potential price increases or change in pricing structure is significant, considering the required volumes, especially for agriculture suppliers	» Consumers becoming more sensitive to the impact of food and beverage production on local environment and populations » Agricultural runoff and wastewater from food/meat processing facilities may have negative impacts on local water sources and ecosystems, potentially damaging company's brand image and reputation
Risks that can be influenced by basin stakeholders	» Freshwater availability (quantity) under pressure due to increasing demand from other basin users » Other basin users may pollute freshwater sources (quality) » Increasing air and water temperatures implies increasing amount of water needed for irrigation due to evaporation	» No or limited regulation or no or limited enforcement by local governments can impact water quantity and quality in basin - New distribution of water rights if government sold more water than available » If operating in a multi-national basin, differences in regulations and enforcement per country can have greater impact on water quantity and quality downstream » Large multinationals are often easy targets for (local) governments - Local companies often favoured over large multinationals for e.g. taxes and regulation	» Decline in economic, social, and physical well-being of consumers due to the lack of access to clean water may affect local market growth - Beverage producers are often vertically integrated and sell directly to end users in local markets » Reputation of especially large multi-nationals is vulnerable in local communities

Table 9. A general overview of water-related risks for the agriculture sector

Country case: India - sugarcane



Share of global production[100]: 19%
Share of imports to Germany[101]: 23%

Sugarcane is the second largest agro-based industry in India[102]. Approximately 5 million hectares, or around 3% of India's gross cultivable area, is under sugarcane production, which accounts for about 7.5% of the national agricultural production's gross value[103]. In 2011, India was the world's second largest sugarcane producer and was responsible for 15% of global production[104]. India's most important production regions are the sugarcane belts of Uttar Pradesh and Maharashtra, followed by Tamil Nadu, and Karnataka[105]. Sugarcane production in India supports 50 million farmers and their families[106].

Water situation

India's two main water sources are rainfall and glacial snowmelt from the Himalayas. About 80% of India's river flow occurs during the four to five months of the southwest monsoon season[107]. Many areas experience localised and severe water shortages before the summer rains and are then subject to flooding during the monsoon. Water resource availability and exploitation across India are also highly variable due to climate and social factors. Although most rivers are of good quality in their upper reaches, water use in cities, agriculture and industries, and the lack of wastewater treatment plants in the middle and lower reaches of most rivers causes major degradation of surface water quality. Municipal, industrial, and agricultural pollutants also affect groundwater[108]. Nearly 80% of untreated urban wastewater ends up in rivers[109]. Additionally, saltwater intrusion in coastal aquifers due to groundwater overexploitation affects yield and farmers' and agribusiness' operations.

Sugarcane is one of the most water-intensive crops. Approximately 90% of sugarcane production is irrigated

Physical risks

Sugarcane is one of the most water-intensive crops. Approximately 90% of sugarcane production is irrigated[110]. Since India's main sugarcane producing areas are located in "severely" stressed water regions, the sugar industry faces a high operational risk[111]. Analysis shows that India's sugar production has consistently increased except during drought years, like in 2008, when production was 45% lower than the previous year due to below normal rainfall[112]. Sugar mills have been shut down due to erratic monsoons and water scarcity caused by declines in groundwater[113].

Based on groundwater resources, irrigated agriculture across India is vulnerable to falling groundwater tables and the decreasing quality of these resources. As surface water supplies decline, farmers turn to pumped wells for irrigation leading to a critical increase in the use of groundwater resources. Waterlogging (the oversaturation of soils with water), especially in large-scale irrigation schemes, has become a localised but growing problem in India. In Punjab, this issue has already caused significant losses in agricultural land[114]. Climate change impacts are expected to aggravate the situation. Studies indicate that, on average, India will reach a state of water stress before 2025[115].

Regulatory risks

Sugar mill effluents are high in organic content. Untreated or partially treated effluent discharge has led to degradation of water and aquatic life, which has resulted in a significant number of conflicts between local communities and sugar industries. A recent example includes the action taken by the Punjab Pollution Control Board (PPCB) to close the AB Grains Spirit Mill at Kirhi Afghana village for causing air and water pollution in the area[116].

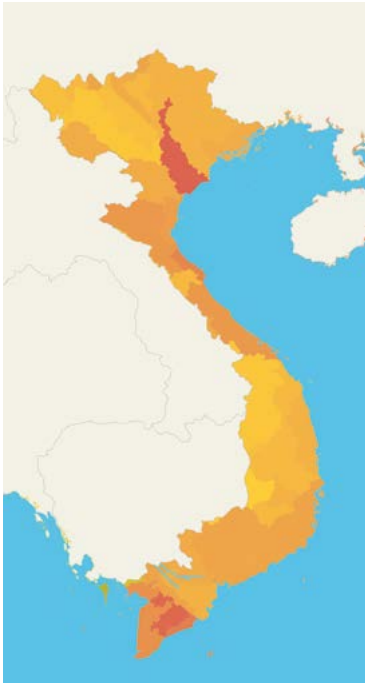
In India, the use, management, and ownership of water is often linked to land or irrigation structures rather than to the resource itself; hence property rights to water are poorly defined. As a consequence, legal disputes over water are often complex and costly[117]. India also shares a number of transboundary rivers with Pakistan, Bangladesh, and Nepal. Water-sharing agreements, particularly with Pakistan, can be a source of tension.

Reputational risks

Public discussions and regulatory sanctions about the environmental impacts related to sugarcane production and processing represent a high reputational risk for companies involved. The accompanying national or international press can damage the reputation of the company involved.

In India, about 35 million farmers grow sugarcane. It needs 2,200 Liters to grow one kilogram. Since most of this is irrigation water, freshwater scarcity is already threatening production.

Country case: Vietnam – coffee



Share of global production[118]: 15%
Share of imports to Germany[119]: 22.5%

Vietnam was the world's second largest coffee producer in 2012[120]. Coffee is Vietnam's second largest agricultural export commodity; exports from the 2012-2013 crop totalled 1.4 million tonnes worth €2.4 billion (US$3.03 billion) or 2% of GDP[121].

Coffee water facts:
- Coffee production provides a livelihood for approx. 2.6 million people – 600,000 of them farmers[122].
- The Vietnamese coffee sector has the highest yields and productivity worldwide with 3.5 t/ha[123].
- Major environmental impacts related to intensive coffee monocultures include deforestation, land degradation, water overexploitation, and intensive fertiliser use (2t/ha/year)[124].

Water situation

Vietnam has abundant surface water resources, of which the Red and Mekong Rivers carry 75%. Approximately 70-75% of the annual runoff is generated during the monsoon season (3-4 months). In combination with limited storage and flood control infrastructure, this results in devastating floods during the wet season and extreme low flows in the dry season[125]. Pollution of Vietnam's surface, ground, and coastal water is increasing. The national Ministry of Natural Resources and Environment classifies many rivers and river segments as gradually "dead" due to downstream pollution and depletion caused by hydropower and irrigation constructions. Groundwater resources are suffering from contamination, salinity intrusion, overexploitation, and limitations in management. As 60% of Vietnam's total water flow originates outside of the country, exploitation and use of water in the upstream countries has had intense impacts on the amount of water flowing into Vietnam's rivers[126].

Efficient irrigation will probably be one of the most critical factors in the near future.

Physical risks

Approximately 87% of Vietnamese coffee cultivation is irrigated[127]. Main problems are overirrigation and inefficient water use, which is why efficient irrigation will probably be one of the most critical factors in the near future. Declining water tables in the coffee production areas, caused by excessive water use and droughts, lead to increased irrigation costs and harvest losses. In addition, large quantities of water are needed for coffee processing. Climate change impact scenarios for Vietnam indicate an increase in the industry's water risk as they predict a decline in rainfall, river flows, and the drop of groundwater level, specifically in the Central Highland coffee cultivation area[128]. The Vietnam Coffee and Cocoa Association predicts that the 2013-2014 coffee output will decrease for the second year in a row due to droughts and heavy rains in the Central Highlands, where 90% of Vietnam's coffee is produced[129,130].

The Ministry of Natural Resources and Environment expects an increase of 48% in total national water use by 2020, with a 30% increase for irrigation purposes, 150% for urban use, and 190% for industry use. The different sectors' competing needs will aggravate the water situation in Vietnam.

Deforestation, depletion, and contamination of water resources pose a high reputational risk for companies involved in Vietnam's coffee production and trade.

Regulatory risks

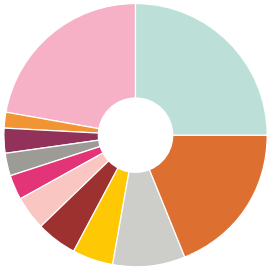
The extensive use of pesticides and fertilisers on coffee plantations, as well as waste produced during the processing of coffee beans, contaminates waterways and causes serious environmental threats. Awareness with regard to consequences for the environment and people is growing among government authorities. To make coffee farming more productive while also reducing environmental impacts, government, farmers, traders, and global food industries are beginning to see the need to develop sustainable practices and work with social and conservation groups to find solutions[131]. By 2020, the Ministry of Agriculture and Rural Development plans on reducing the area for coffee beans from the nation's current coverage of 530,000 to 500,000 hectares, 20,000 of which are to be located in the provinces of the Central Highlands and Binh Phuoc, in an attempt to make coffee production more sustainable and effective.

Reputational risks

Vietnam's intensive coffee monoculture plantations are associated with immense environmental costs. Deforestation, depletion, and contamination of water resources pose a high reputational risk for companies involved in Vietnam's coffee production and trade. Currently, only 10% of the coffee grown in Vietnam meets following sustainable standards (in comparison to 75% in Latin America)[132].

Vietnam is one of the biggest coffee suppliers to Germany. Much of it is irrigated and droughts may threaten production in the future.

Figure 11. Overview of countries from which Germany imports chemicals (based on tonnes imported)



Netherlands	25%
Belgium	19%
France	9%
Poland	5%
Austria	5%
UK	4%
Italy	3%
Spain	3%
Czech Rep.	3%
USA	2%
Remaining (143 countries)	22%

3.2.4 Chemicals

In 2011, (non-pharmaceutical) chemicals accounted for €1,181 billion (US$1,500 billion) in global exports, representing 8.4% of world trade in merchandise and 13% of world trade in manufactured goods. Within the European Union, Germany is the largest[133] and globally, the fourth largest chemical producer (after China, USA, and Japan) with approximately €150,758 million (US$191,463 million) worth of (non-pharmaceutical) chemicals having been produced in 2012[134]. Six German companies rank among the world's top 40 chemical producers.

Chemicals are used to make virtually every man-made product – more than 96% of all manufactured goods depend on the chemical industry[135]. The chemicals sector is comprised of base (petrochemicals and derivatives and inorganics), speciality (auxiliaries for industry, paints & inks, crop protection, dyes & pigments), or consumer (soap, detergents, bleaches, hair and skin care products, essential oils, fragrances, etc.) chemicals. Other chemical companies or industries (e.g. metal, glass, electronics) use the majority of the tens of thousands of substances produced by the global chemicals industry[136].

Top countries of import to Germany and their water risk

While the majority of Germany's chemical imports stem from European countries and the USA (see Figure 11), they are often products in the processing stage of the value chain or companies that import and then re-export raw materials (see Side Note 3). Europe itself is relatively poor in natural resources and relies extensively on imported raw materials to produce its chemicals products. Whereas the re-distributor could change at any moment, the raw material source country will continue to produce until its reserve is exhausted. As it is difficult to find reliable data on German chemical raw material imports and it often reflects re-imports, Table 10 presents the water risks for the main countries producing inorganic raw materials globally[I], that are used in production processes of the chemical industrial sector.[137]:

- 21.7 million tonnes of organic raw materials
  - 19 m tonnes of fossil fuels (81% naptha and oil derivatives, 17% natural gas, 2% coal), of which 95% are imported [138].
  - 2.7 m tonnes of renewable feedstocks (50% plant oils and animals fats; 14% cellulose, 12% sugar, 11% starch, 7% fibres, and 4% other natural components), of which 65% are imported [139].

- 20 million tonnes of inorganic raw materials (minerals)
  - In order of importance, the main inorganic raw materials are sodium chloride, limestone (included as lime in Table 10 due to chemical industries predominant reliance on lime), potash, sulphur, bauxite, and phosphate rock (based on data from 2006)[140].

I While these raw materials (i. e. like bauxite in the automobile industry) are used in many different sectors, the water risk is reviewed only in relation to the chemical sector.

Raw material	Top 5 global production countries	Physical risk	Regulatory risk	Reputational risk
Sodium chloride	China			
	USA			
	Germany			
	India			
	Australia			
Lime	China			
	USA			
	India			
	Russia			
	Japan			
Potassium salts (potash)	Canada			
	Russia			
	Belarus			
	China			
	Germany			
Sulphur	China			
	USA			
	Russia			
	Canada			
	Saudi Arabia			
Bauxite	Australia			
	China			
	Brazil			
	Indonesia			
	India			
Phosphate rock	China			
	USA			
	Morocco & Western Sahara			
	Russia			
	Jordan			
Organic, non-renewable raw materials	Oil, natural gas, coal - please see the Extractives chapter			
Organic, renewable raw materials	Plant oils and animals fats, cellulose, sugar, starch, fibres – please see the Agriculture chapter (for example: oil palm, sugarcane)			

Table 10. The water risk for the top five countries (based on global production in 2012[141]) producing the main raw materials used in Germany's chemical industry. The top five countries with the highest reserves of potash, bauxite, and phosphate rock are different than the current top producers. In some cases, these countries have not been able to exploit these resources due to political instability or a lack of resources. High ■ Medium ■ Low ■

*See 3.1 Water Risk Analysis and Methodology for further details.

Sector water risk and water intensity

The chemical industry is known as one of the major industrial users of water, with cooling requiring the highest use. Water is also used to make and wash chemical products and for steam generation, cleaning, safety related activities (i. e. deluge systems), and re-use processes.

The chemical industry is known as one of the major industrial users of water, with cooling requiring the highest use.

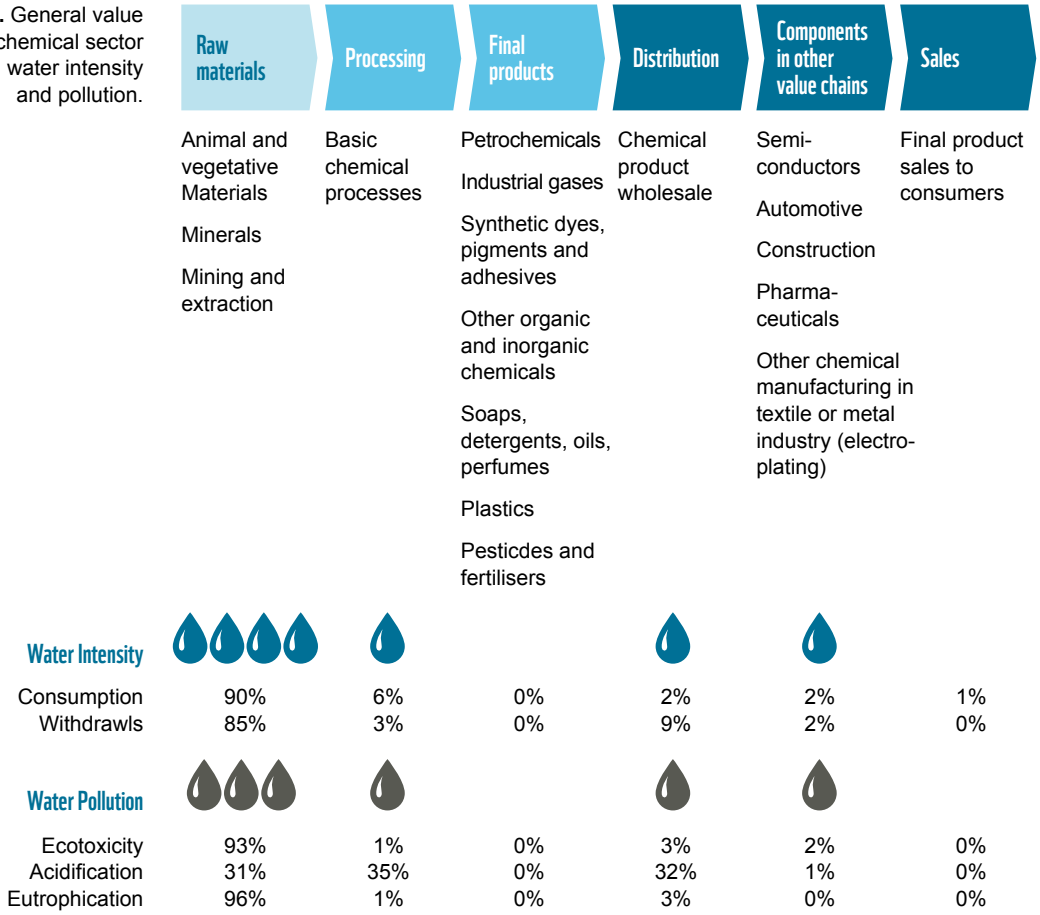
While one of the greatest risks for the chemical industry is pollution during the processing stage, this is only the case in countries with lax or non-existent regulations, which is not the case for the main countries from which Germany imports its chemicals. For those countries with lax control where contaminated and/or heated water used during the chemical production enters into the water systems, companies face regulatory and reputational risk. Otherwise, the greatest risk lies in the raw materials (organic or inorganic) that provide the base for the chemicals industry. The water risk during the extraction of oil and salts and during the production of sulphur is particularly high.

Some key figures

- In 2013, BASF's water use totalled 5.7 million m³ of water – 86% of which was used for cooling and 14% for production[142].
- Compared to all other manufacturing industries, the chemicals industry in OECD countries was the largest water consumer (43%) in 1995[143, 144].
- In 1986, water used to extinguish a major fire at Sandoz, a Germany chemical factory, washed chemicals into the Rhine River. The spill caused severe pollution, which took years to eradicate, and killed an estimated 500,000 fish[145].
- In the Netherlands, Dow Chemicals designed a reverse osmosis process to treat and clean 10,000 m^3 daily of grey municipal wastewater[146].

The chemical industry supply chains are complex. Many of the raw material products come from countries with high water risks. Depending on the product, a lot of water is needed for cooling during processing.

Figure 12. General value chain of the chemical sector and associated water intensity and pollution.

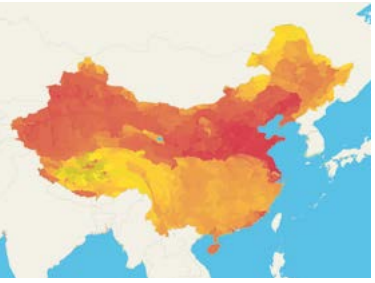


	Physical risk	Regulatory risk	Reputational risk
Risks that can be influenced by a company	» Disruptions or declines in water supply limit industrial use for production, material processing, cleaning, and especially cooling, which demands the most water - As the industry's manufacturing footprint expands to more water-stressed regions of the world including the Middle East, India, and China, water scarcity will become a greater issue - Highly polluted water may require on-site water purification for operations	» Stricter regulation and increased enforcement by governments may increase cost for freshwater and wastewater treatment and discharge - Lawmakers may force companies to use innovative production technologies to reduce impact on water - Impact of potential price increases is significant, considering the required volumes » Companies must comply with numerous international, regional, and national standards - The EU's Water Framework Directive is driving the phase out of 33 priority chemicals with the goal of improving water quality in key river basins. The EU legislation, REACH, places greater responsibility on industry to manage the risks to the environment and health	» Reputational risk is particularly high as a result of accidents, spills, or product impacts on water resources and environment (e.g. Union Carbide factory explosion in 1984 in Bhopal, India[J]) » Governments, communities, NGOs and companies looking at their own supply chain footprint are increasingly concerned with the high amount of chemical discharge and potential negative impacts on water resources and surrounding ecosystems » Conflicts with local communities over access to water threaten license to operate and damage to brand image » Waste discharge on water quality, with consequences for downstream users and aquatic ecosystems
Risks that can be influenced by basin stakeholders	» Freshwater availability (quantity) under pressure due to increasing demand from other basin users - As the chemicals industry shifts to areas facing severe physical and economic water scarcity, companies competing with local communities could lose their license to operate » Other basin users may pollute freshwater sources (quality) » Increasing air and water temperatures imply more water needed for cooling and operation, while evaporation of water sources is increasing	» Large multinationals often easy targets for (local) governments - Local companies often favoured over large multinationals for e.g. taxes and regulation » No or limited regulation or no or limited enforcement by local governments can impact water quantity and quality » If operating in a multi-national basin, differences in regulations and enforcement per country can have greater impact on water quantity and quality downstream » A company can lose its license to operate or incur higher costs because of changes in water rights, pricing, and wastewater treatment requirements	» In case of local water scarcity or wastewater pollution in the basin of operation, reputation of especially large multinationals is vulnerable in local communities » End user (consumer) pressure not to buy products in troubled basins

Table 11. A general overview of water-related risks for the chemical sector [147, 148]

J Dow Chemicals, which acquired UC, was ordered by the state of Maharashtra in 2009 to relocate a proposed research

Country case: China – chemical industry



Share of global production[149]: 28.7%
Share of imports to Germany[150]: 2.9%

China was the world's largest chemical producer in 2011 with sales far exceeding other countries (€735 billion vs. €409 billion from USA, the second largest producer)[151]. Accounting for 10% of China's GDP, the chemical industry is the country's third largest sector[152]. KPMG predicts China's chemical industry will grow by between 9 – 11% during 2013-2015, which exceeds all other chemical producing countries[153].

Water situation

While 20% of the world's population resides in China, the country only has 7% of the planet's freshwater reserves[154]. China can be divided into nine main river basin groups, yet approximately 80% of the country's renewable surface water resources are in the south. To balance this unequal distribution, a huge water diversion project is underway to transfer water from the south to the north, which could potentially have serious environmental implications for the south.

The main water problems facing China are: groundwater overextraction and falling water tables (particularly in the north); pollution – 70% of China's rivers and lakes are significantly contaminated, 50% of China's cities have polluted groundwater, and over 30% of China is affected by acid rain[155]; and severe water stress – 44.7% of the country suffers from water stress[156]. Water shortages and droughts dampen China's economic development causing direct economic losses of €27.56 billion (US$35billion) annually[157]. Environmental pollution accidents occur frequently in China; almost half of the 1,400 accidents in 2005 involved water pollution[158].

Over 45,000 kinds of synthetic chemicals are being produced, used, and discharged into China's waterways.

Physical risks

Over 45,000 kinds of synthetic chemicals are being produced, used, and discharged into China's waterways[159]. Twenty per cent of the groundwater used as drinking water in China's urban areas is contaminated, sometimes with hazardous carcinogenic chemicals[160].

Greenpeace China found that the coal and chemical industry's water consumption rates are drying up northern China's already scarce water supplies. It is predicted that by 2015, the coal and chemicals industry will consume 25% of the annual water flow from the Yellow River[161].

Regulatory risks

The regulatory landscape varies within China's different regions, which requires companies to pay close attention to both local and national regulations. Responsibilities for water resources, data and information, infrastructure construction, environmental protection, agricultural development, transportation, and other water-related activities are split among competing and conflicting institutions[162].

With the introduction of the "Law on the Prevention and Control of Water

Pollution" in 1984 (revised in 2008) and the Water Law in 2002, China established regulatory control to prevent and control freshwater pollution and water resource use. Some of the Water Law's provisions allow for tougher penalties on polluters, a discharge permitting system, citizens to bring class action suits against polluters, improved standards, and increased transparency and penalties for inadequate government enforcement[163].

Historically for companies in China, it has been more profitable to pay pollution fines rather than implement prevention measures to the point that some companies incorporate such expenditures into their budgets. However, recent amendments to the Water Pollution Prevention Control Law have raised financial penalties on polluters with no maximum limit specified for serious incidents[164].

Addressing China's water problems has been hampered by local government efforts to protect local industries and jobs, government corruption, the desire to sustain rapid economic growth, and the national environmental regulatory body, the State Environmental Protection Administration (SEPA)'s "crippling weakness"[165]. It is currently rumoured that the 1989 Environmental Protection Law is being revised to place more emphasis on the environment as a consequence of China's environmental degradation[166].

40% of the more than 40,000 plants in the petrochemical, chemical, and pharmaceutical industries surveyed posed a severe threat to public health.

Reputational risks

As a consequence of growing internal dissent and conflict over both water allocation and water quality, the central and regional governments are facing increasing pressure to address water problems. Chinese citizens are increasingly aware of environmental issues, and activism against water pollution is increasing. There were an estimated 187,000 environmental protests in 2012, which is an average of 500 protests a day[167].

For the first time ever, the Chinese government has officially acknowledged the existence of "cancer villages," which are often located near factory complexes. These villages rely on rivers polluted with toxic chemicals for their drinking, washing, and cooking water[168]. The Ministry of Environment determined that 40% of the more than 40,000 plants in the petrochemical, chemical, and pharmaceutical industries surveyed posed a severe threat to public health[169].

In 2005, a chemical plant explosion in the city of Jilin contaminated the Songhua River with 100 tonnes of benzene-related pollutants. Local residents reported tap water turning red or yellow[170]. Water supply to nearly 4 million people in Harbin, the capital of Heilongjiang Province, was suspended[171]. Though the government responded with plans to build over 200 "pollution control projects" along the Songhua River and shut down a small number of commercial and industrial enterprises in an effort to cut the worst pollution, China continues to suffer chemical accidents and severe pollution. This shows, that the chinese government is ready for strict and sudden environmental action if nessecary.

Indirect water risks: retail & financial service sectors
The water risks for the retail and financial sectors are mostly indirect since they are often connected to suppliers (retail sector, especially from agriculture) and investments and/or in the countries they invest in (financial services sector) rather than direct operations. Retailers rarely own the farms and processing plants that are supplying them. The same applies for a bank's investment portfolio. Though all economic sectors are represented in the financial services sector, water risk is more easily identifiable among some sectors.

Depending on the supplier or investment, simply shifting to other opportunities might not be an option. Thus, the relationship between the retail sector and its suppliers and the financial services sector and collective action for risk mitigation.

3.2.5 Retail

Indirect exposure to water-related risks through suppliers can be very high, especially for food and apparel retailers.

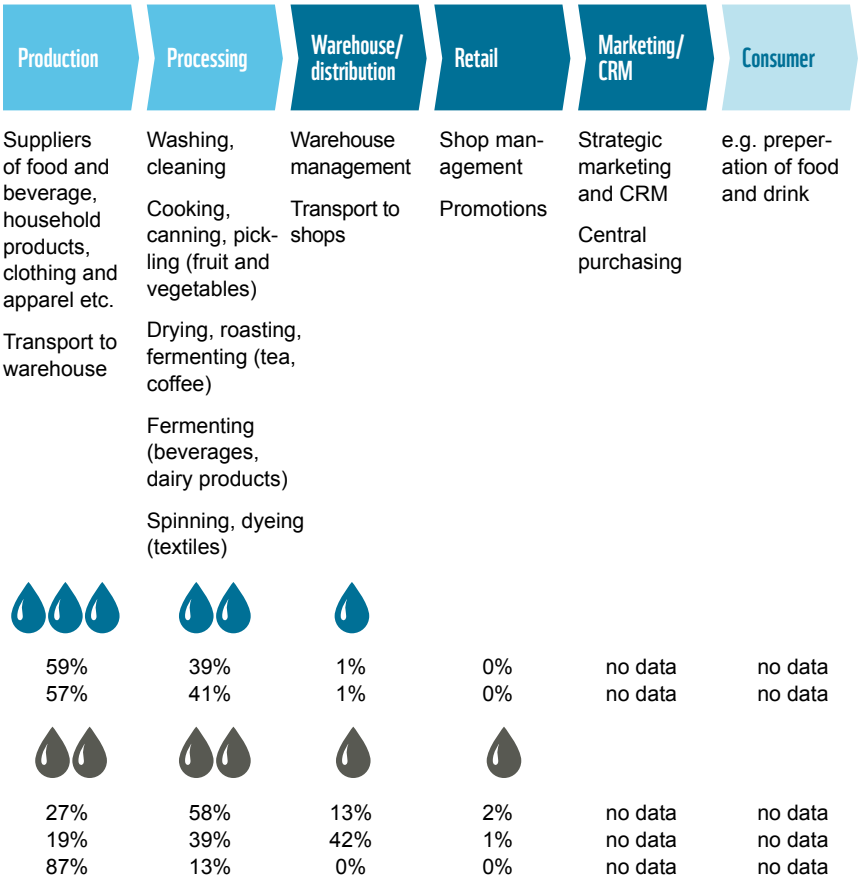
In 2012, Germany's retail sector contributed 16% to the GDP and grew 1.8% on average annually since 2009. In 2013, the predicted turnover was more than €432 billion (US$548.64 billion)[172]. The food retail industry, which includes nine of Germany's top 10 retail companies, comprises 32% of the total turnover. The fashion and accessories branch is the second largest contributor with 18.6% turnover. Home and leisure, cosmetics and body care, and department stores contribute less than 10% each to total turnover[173].

Sector water risk and water intensity

The retail sector's direct exposure to water-related risks are low as they operate in Germany and use small amounts of water for cleaning, cooling, and sanitary uses, and pollution is limited (see Figure 13). However, their indirect exposure to water-related risks through suppliers can be very high, especially for food and apparel retailers (see also sector description on 3.2.1 Textiles and apparel and 3.2.3 Agriculture). Agricultural outputs are particularly dependent on water for irrigation, cleaning, processing, power generation and transportation. The water use of suppliers (like agriculture) may ultimately impact overall water availability in a significant way, especially when located in a threatened water basin.

Retailers face direct and indirect water risks related to their product supply chains. For food retailers these risks are often connected to agricultural production.

Figure 13. General value chain for a convenience product and associated water intensity and pollution



According to a survey of CDP in 2010, few retailers were able to identify which of their operations were located in water-stressed areas[174]. While some retailers feel that their suppliers' water-related issues are not their concern, others have established good relationships with reliable suppliers that provide good quality, quantity, and well-priced products. If water risks interrupt supplies, like the availability of sufficient amounts of unpolluted freshwater, stricter regulations, or community conflicts, retailers often change suppliers.

There will be increasing competition between national and international retailers especially for commodities produced in water scarce regions.

For certain commodities (tropical fruits, vegetables in winter, cotton, etc.), simply shifting supply chains will no longer be a sustainable option. Limited land, a growing population, changing global consumption patterns, and climate change will have huge effects on availability, quantity, quality, and ultimately the price of these goods. There will be increasing competition between national and international retailers especially for commodities produced in water scarce regions. Furthermore, consumers are becoming increasingly conscious of the social and environmental costs associated with the products they buy, including water. A growing trend in the retail industry has been the introduction of various labels and certifications.

In order to sustainably handle water risks related to suppliers and producers, retailers have to start analysing their product-related risks (farm, factory and river basin-level). Depending on the commodity, they will have to find ways to support their suppliers and producers work towards the sustainable development of water resources beyond a given farm or factory.

	Physical risk	Regulatory risk	Reputational risk
Risks that can be influenced by a company	» Indirect water use; therefore risk is limited » Water scarcity or contamination of water sources may interrupt retail suppliers - Indirect water use, especially from agricultural suppliers, is significant - Changes in precipitation patterns, severe drought, and flooding due to climate change may interrupt supplies since the most significant water use is embedded in crop or livestock production, and potable water is a non-substitutable ingredient for beverage products	» Direct risk is expected to be limited » However, the risks may be significant for suppliers - Increasing competition with other water users in the basin may lead to withdrawal of water rights - Stricter regulations and increased governmental enforcement may increase cost for freshwater and wastewater treatment and discharge, which would lead to price increases	» Most significant for retailers as consumers become more sensitive to the impact of their purchases on the environment and local populations - Depending on the situation, consumers may decide to refrain from buying certain products in the store or not to shop in the store at all » Potential causes of brand and reputation damage are: - Agricultural runoff and wastewater, which may have negative impacts on local water sources and ecosystems - High water use in areas where population lacks drinking water
Risks that can be influenced by basin stakeholders	» Relatively low due to low direct consumption and opportunity to switch suppliers in case of supplier interruption - Freshwater availability (quantity) for suppliers might be under pressure due to increasing demand from other basin users - Other basin users may pollute freshwater sources (quality)	» Some potential risk for suppliers, which may impact competitive position of retailer: - No or limited regulation or no or limited enforcement by local government can impact water quantity and quality in basin - If operating in a multi-national basin, differences in regulations and enforcement per country can have greater impact on water quantity and quality downstream	» Reputation may be damaged by selling products that require a lot of water and are produced in basis with high water-related risks » Decline in economic, social, and physical well-being of consumers due to lack of access to clean water may affect market growth for retailers located in that area

Table 12. A general overview of water-related risks for the retail sector

Side Note 4. EDEKA – one of Germany's leading food retailers
An economic strategy that adapts its resource consumption to availability is central to a secure future. As a steadily decreasing resource, freshwater plays a key role due to its fundamental importance for retailers and far-reaching effects on the environment. For EDEKA, responsible water use is therefore a key issue in its path towards increasing sustainability.

Freshwater is one of EDEKA's defined priorities in its strategic sustainability partnership with WWF. Together with WWF, 2,300 EDEKA store brand products have been analysed for water risk within the geographical production areas. This allows urgent action areas that require sustainable water management projects to be identified. In 2014, a pilot project on banana farming between EDEKA and WWF will address the issue of water. In collaboration with WWF and GIZ, EDEKA is planning to test this comprehensive approach to risk reduction in a potato farming project in Egypt.

Due to the number of products, their origin from almost all parts of the world, and the length of their value chains, the implementation and monitoring of standards represents a challenge for the food retail industry. Starting with its store brands, EDEKA is continuously working towards anchoring water standards in corporate activities that allow the water situation to be as transparent as possible and to reduce water risks responsibly.

3.2.6 Financial Services

In 2012, Germany's financial services sector contributed 3.5%, or €94,420 million (US$119,913.4 million) to Germany's GDP[175]. The financial services sector encompasses a broad range of organisations and structures that are diverse and present business models that differ significantly, from commercial to investment banks, from institutional investors to insurance companies and the insurance business, as well as a range of intermediaries. Many "real economy sectors" are linked to and influenced by the financial services sector and thus, their water risks are embedded in any investment and financing portfolio that includes them. Consequently, strategies to mitigate water risk have to be tailored towards the relevant and subsequent business models of the specific financial institution. Interaction between financial institutions and companies found in the real economy is essential to setting the right criteria, dealing with information requests, and ultimately reducing relevant water risks.

Sectoral and company specific water-related risks resonate variously with financial institutions – from business risks increasing probability of default, to value impairment, to investments and assets, or to new business opportunities. For instance, insurance companies see freshwater shortages as an opportunity to grow their business. As companies become more concerned about potential water supply shortfalls, they will likely seek insurance against business interruption.

A key interest of financial service providers should be to understand their client's exposure to water-related risks and interdependencies.

Water is a more material risk than, for example, climate change risks, though both of course are interrelated. Water-driven hazards are having more impact and are harder to predict than before as a result of growing water demand due to the growing world population, unpredictable impacts of climate change, ongoing urbanisation, and a change in consumption patterns.

A key interest of financial service providers should be to understand their client's exposure to water-related risks and interdependencies. If these risks materialise, the effects will most likely have direct consequences for portfolios, financing and investment activities, and the business performance of financial service companies. Due to intensified public and shareholder awareness, a financial institution's reputational risk will increase if a client demonstrates insufficient water risk management. In the past few years, the number of environmental and social policy resolutions filed by investors has strongly increased, especially in the USA[176].

Sector water risk

Seasonal droughts and floods, bad water quality, and changes in water-related regulations are standard risks faced by financial services. Insurance companies should be aware of their client's resilience to water-related risks and management strategies because they can be simultaneously affected as insurers and investors.

Impacts of a changing climate are expected to lead to increased insurance risks related to water. The most expensive natural disasters Germany experienced in the last 10 years were flooding (Elbe flood in 2002) with material damages estimated at €1,800 million (US$2,290 million), a hail storm (2011) at €300 million (US$381 million), and torrential rain (2008) at €100 million (US$127 million)[177]. In other locations, climate change is likely to lead to reduced rainfall and could bring more frequent claims related to drought and water shortage, which in itself might lead to the un-insurability of either a region or products. It has been calculated that the average annual economic consequences of droughts in Europe over the last two decades has drastically increased, costing €6.2 billion/year in the most recent years [178].

As financial institutions are a key enabler of economic development, they can also be key for sustainable development.

Strategies to understand, capture, and measure potential and actual water-related risks for financial institutions can vary greatly, from actively hedging against weather-related effects to properly understanding, engaging, and cooperating with companies to become resilient or adjusting their business models to the causes and effects. Some development banks have made good strides in reducing the water risk in their portfolios, for example, by providing technical assistance to their clients (see Side Note 5). Development and implementation of mitigation strategies and new technologies to address future challenges and increasing water demand and climate change impacts are entering the agenda of public and private decision-makers. As financial institutions are a key enabler of economic development, they can also be key for sustainable development. Important aspects are sustainable water management, efficient water use, alternate approaches to water supply, water pollution minimisation, and water resource recycling – all to be put into the perspective of the given river basin's specific circumstances.

While the origin of water risks will stay the same, each branch in the financial services sector (see Table 13) for a selection of some of the most important) has to develop its own understanding of where water risks are emerging and materially relevant for their portfolio and/or investment's performance and how these should be integrated in their processes.

Financial services sector	General business model	Example of processes relevant to water risks
Commercial and universal banks	Lend money directly to customers / companies	Risk of default and credit risk deterioration if companies/debtors are affected by water risks (e.g. water scarcity threatens agribusiness profits leading to default).
Investment banks and corporate finance	Help businesses raise money from other firms in the form of bonds (debt) or stock (equity)	Water risks related to commodity trading (e.g. palm oil, cereals) impact the business directly, as well as future prices on commodity markets (see also agricultural section). This can impact the ability to pay interest or repay debt.
Development banks and other government-sponsored enterprises	Government-sponsored organisations (e.g. World Bank, KfW) invest in and provide credit to companies and infrastructure in developing countries	Similar to retail and universal banks, but with even greater reputational pressure for sustainable financing.
Private equity investments	Closed-end funds, which usually take controlling equity stakes in businesses that are either private or taken private once acquired	Poorly handled water risks will reduce returns and repayment of capital or options for public offerings.
Asset management	Offer a conglomerate of financial services from more than one sector; mostly manage third party funding	The value of investments made in asset management processes (buying of shares, property, etc.) can significantly decrease due to water risks connected to the asset. Investors also bear a high reputational risk as the real or perceived impacts of a company's operations on communities and environmental habitats may negatively impact the investing company's reputation.
Insurance companies	Provide cover for selected risks and transfer those risks to capital markets in other forms	Underestimating water-related risks caused by hydrological changes in water basins, regulation, and reputation can cause additional risks for clients and lead to an increased number of claims.
Re-insurance companies	Take primary insurance cover policies and restructure them to market to other investors or insurance companies, allowing primary insurers to reduce their risks and protect themselves from very large losses	Claims are caused because of business interruption due to natural disasters like droughts or flooding or regulatory changes. House/property insurance (damage of flooding, fire) and liability/ indemnity (claims of reduction in water quality/quantity through pollution/overabstraction) are particularly affected.

Table 13. Some of the most important branches in the financial services sector and examples of associated water risks

In recent years, the financial services sector has become increasingly aware of water-related risks and the need to establish adequate mitigation strategies. Initiatives like the Equator Principles and the UN Principles on Sustainable Investment have contributed to raising awareness and prioritising water risks. According to the 2013 CDP Global Water Report, the number of investors requesting corporate water data through CDP has quadrupled in just three years. Some of the most important German institutions – Allianz Group, Bayern LB, Deutsche Bank, Generali Deutschland Holding AG, and KfW Bankengruppe – are among the signatory CDP investors[179]. However, what remains very open to date is the further use of such information within investor processes.

	Physical risk	Regulatory risk	Reputational risk
Risks that can be influenced by a company	» Underestimation of water- related risks for assets, debtors, commodity suppliers and clients, resulting in financial risk - Due to lack of understating of water-related risks - Due to lack of information or water-related risk evaluation methodologies - Water-related risks are different for each of the clients and suppliers, due to different industries and basin contexts	» Stricter regulation and increased enforcement by government may increase costs for freshwater and wastewater treatment and discharge and therefore the bottom line performance of assets, debtors, and commodity suppliers - Regulation to force companies to use innovative production technologies to reduce impact on water - Potential price increase or changes in pricing structures » Regulators may force insurance companies to cover more water risks - This can result in higher uncertainties and potential claims, which in turn may impact prices and even presence in certain countries	» Assets, debtors, or commodity suppliers in high water risk industries may negatively impact reputation. - In general, the public and insurance company clients are becoming increasingly sensitive to impacts on local environments and populations » Risk that claims are partially covered by insurance companies, while general public is expecting full coverage - Ensure clients understand their water-related insurance policies
Risks that can be influenced by basin stakeholders	» Most financial institutions and insurance companies still seem to ignore the importance of knowing the freshwater context that their clients or suppliers are operating in - Freshwater availability (quantity) may be under pressure due to increasing demand from other basin users, and other basin users may be polluting freshwater sources (quality)	» No or limited regulation or no or limited enforcement by local government can impact water quantity and quality in basin and therefore increase financial risks - E.g. If governments sold more water than available, if there is a large difference in regulation and enforcement in different countries in the same basin, or if enforcement is insufficient	» Assets, debtors, or commodity suppliers in high water risk geographies (basins) may negatively impact reputation - This can be the case even though the specific investment is highly efficient and not polluting water

Table 14. A general overview of water-related risks for the financial services sector

Side Note 5. DEG – Entrepreneurial Development Cooperation
DEG, a development finance institution and subsidiary of KfW, invests in projects that contribute to sustainable development in all sectors of developing and emerging country economies, from agriculture to infrastructure and manufacturing to services. DEG also invests in the financial sector in order to facilitate reliable access to capital locally. To date and with around €12 billion in financing, DEG has worked together with more than 1,700 companies and contributes to facilitating entrepreneurial investments.

DEG systematically applies the IFC Performance Standards (IFC PS) to all of its investments for environmental and social due diligence. All projects are screened against this international standard, gaps are identified, and roadmaps are defined and negotiated between DEG and its clients on how to reach compliance over time. Water and water-related ecosystem services are considered critical from the environmental and social perspective, in particular as they represent key indicators for climate change impacts. As the IFC PS do not provide a tool for assessing company- and basin-related water risks in itself, WWF together with DEG developed such a tool. DEG's Sustainability Department has applied this to its due diligence process for and with selected clients in high-risk sectors and regions since 2012. It gives added value and information to the environmental and social due diligence process and helps define and prioritise an action plan's measures.

Examples of mitigation measures addressing company-related water risks are water treatment facility installations in Bangladesh's textile industry or Vietnam's leather industry, covered directly through DEG's investment or through accompanying measures supported with funds either from DEG or Germany's Ministry of Economic Cooperation and Development (BMZ). Basin-related risks are more challenging to address as they require the active engagement of local and national governments as well as other relevant stakeholders. One exemplary approach was with a client in Panama – DEG helped launch a hydropower basin initiative on the Chiriquí Viejo River to assess cumulative impacts and risks of the existing and new hydropower projects along the river.


50% of our global wetlands have disappeared in the last century.
In Brazil, the Amazon wetlands are high-biodiversity hot spots
that are threatened by rapid economic development.

4 Water Stewardship – From Risk to Opportunity

Depending on a company's operation and supply chain, its water risks will vary. For example, the agricultural sector will be directly affected while the food retail sector will be indirectly affected – even though they both share the same risk. The risk is often not caused by the company itself but by the interaction of various stakeholders that use the same water. Therefore, a company can rarely manage all of these so-called "shared water risks" internally or alone. Action is required at the local and/or river basin level, which typically involves some degree of cooperation with other stakeholders or government[180].

Water stewardship goes beyond being an efficient water user.

Water stewardship goes beyond being an efficient water user. It means contributing to the responsible and sustainable management of freshwater resources, and finding solutions for "shared risks" in a specific river basin. The root cause of water risk is often not the availability or use of water, but governance; unless an entire river basin is managed in a sustainable way, one company's improved efficiency will likely be overshadowed by increased use by a competitor or a neighbouring community. This makes water the ultimate shared resource – and everyone's responsibility[181].

Becoming a good water steward requires recognising water as a strategic and core business issue that is material to profits and long-term opportunities for growth.

Consistent with this idea, sustainable business engagement should not simply be a matter of corporate social responsibility (CSR) or public relations. There is an essential business case for achieving sustainable flows – access to clean water in order to sustain production and profitability. It is important for companies to understand that if they undertake water-related activities from a CSR perspective alone, it is unlikely that they can address the underlying water risks they face or leverage the potential opportunities.

Companies that evolve from understanding their portfolio's water risks towards implementing water risk management strategies decrease their risk exposure. Becoming a good water steward requires shifting from ad hoc and philanthropic initiatives to recognising water as a strategic and core business issue that is material to profits and long-term opportunities for growth[182].

Water stewardship[K]
The use of water that is socially equitable, environmentally sustainable and economically beneficial, achieved through a stakeholder-inclusive process that involves site and catchment-based actions. Good water stewards understand their own water use, catchment context and shared risk in terms of water governance, water balance, water quality and important water-related areas; and then engage in meaningful individual and collective actions that benefit people and nature.

4.1 Water Stewardship Steps

Because reducing water risks often requires a complex approach, companies are increasingly using practical approaches like WWF's water stewardship model, especially when risk is already high or if poor management from public authorities is seen as a future risk. By using the water stewardship model, companies are able to lower their internal and external water-related risks. Ultimately, companies can contribute to a sustainable water management at their local level of engagement, for example by promoting clearer, consistent laws and regulations that govern water use[183].

K http://www.allianceforwaterstewardship.org/about-aws.html#what-is-water-stewardship

Figure 15. The water stewardship journey

Influence governance

» Advocacy, influencing or lobbying, partnerships, financial support, facilitation or institutional strengthening at local, watershed, state or national level

Collective action

» Engaging with stakeholders at various levels (global forums to local water groups). This can include participation in public forums to address water management issues, support for freshwater conservation projects, partnerships to pool technical, human and financial resources to conserve freshwater resources, participation in collective actions to improve water management

Internal action

» Putting a strategy in place with goals and measures: launching water efficiency projects; engaging with employees, consumers and marketing to address opportunities and risks; improving water quantity and quality reporting; preventing pollution

» Engaging suppliers and assessing options such as alternative sourcing, product innovation or improved management of water in raw materials production

Knowledge of impact

» Understanding the company's water footprint: direct (company operations) and indirect (supply chain) water dependencies

» Analysing water risks (e.g. with WWF Water Risk Filter) and estimating impact on water resources. Risks should cover physical (e.g. quantity, quality), regulatory (e.g. legislation, enforcement) and reputational (e.g. media attention, community conflicts)

Water awareness

» High-level understanding of global water challenges, the company's dependence on freshwater, and its exposure to water-related risks

» Internal commitment by CEO to plant managers, suppliers, and employees

» Understanding of how the company is perceived by others, including basin stakeholders, the press and consumers


INFLUENCE GOVERNANCE
Government incentivised and motivated to manage and invest in water basins in a sustainable way
COLLECTIVE ACTION
Companies, communities, public sector and NGOs are engaged together in collective action to address issues
INTERNAL ACTION
Companies take action to optimise internat water governance, improve water efficiency and reduce pollution
KNOWLEDGE OF IMPACT
Companies have detailed understanding of impact they and their suppliers have (incl. footprint and risk)
WATER AWARENESS
Companies, their suppliers and customers have (high level) understanding of the global water challanges, and their dependence on freshwater

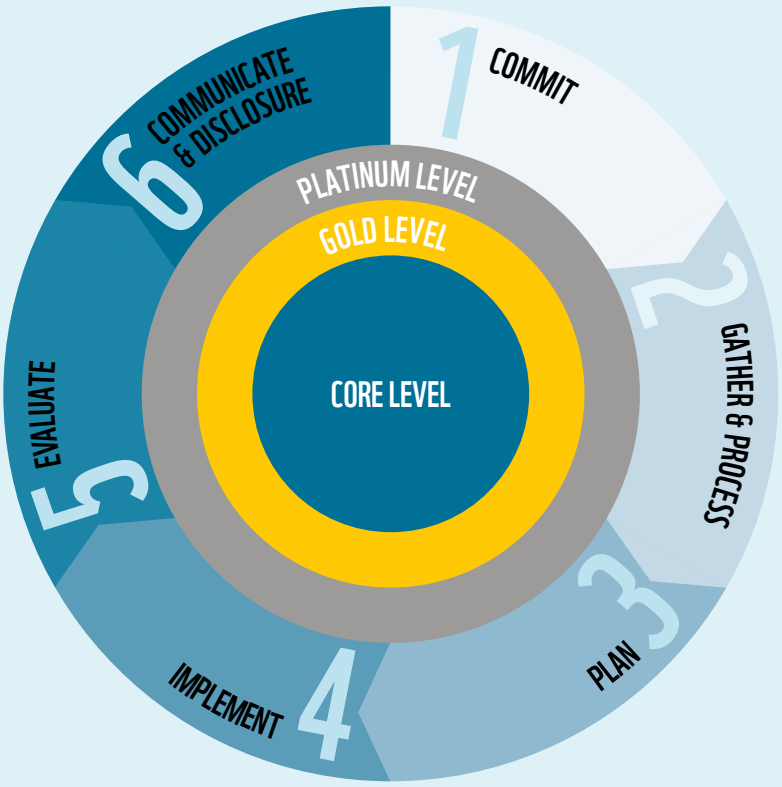
Side Note 6. Water stewardship at WWF

Starting in 2005, WWF pioneered work on the "water footprint" to prompt a new kind of discussion with companies and governments – one that raised essential questions about vulnerability to water risk. Over time, our water stewardship programme emerged. We saw companies starting to take action and capitalised on the opportunity to shape their journey – first with awareness, moving on to internal action, and culminating with collective action and policy advocacy in support of sustainable water management. The strategy requires implementing projects in river basins at risk to demonstrate what "good" water stewardship looks like, with the goal of creating sound models to replicate.

WWF engages in stewardship partnerships with strategic companies – those with high exposure in river basins at risk, key business sectors, and/or those that have committed to leading and catalysing collective action. Bilateral partnerships are important, but we won't save the planet one company at a time. WWF seeks to shape the thinking of businesses, financial institutions and economic initiatives such as the CEO Water Mandate and the World Economic Forum.

The Alliance for Water Stewardship is a non-profit initiative, founded in part by WWF in conjunction with a group of other organisations including The Nature Conservancy, CDP, and the United Nations Global Compact, with the aim to drive water stewardship on the ground. At the core of the AWS is a global water stewardship standard and certification scheme, which allows sites to demonstrate, through third party audits, their efforts to mitigate water risk and address water challenges both at the site and catchment level. Ultimately, the AWS Standard is designed to provide benefits to the implementing businesses, neighbouring communities who share their water resources, and species that inhabit these catchments.

Designed for any sort of facility in any environment, the Standard involves six steps:



Next to individual and tailored projects on water stewardship, the AWS is an opportunity for companies towards a commitment on water risk reduction.

In response to a real demand, WWF created a "pull" of interest from companies and the WWF network rather than a "push" of strategy from the top. Through numerous examples of successful private-sector partnerships, companies trust and are willing to turn to WWF for guidance, even when that means they have to admit they don't have a perfect track record. WWF's established presence in priority river basins has also earned the trust and respect of river basin authorities, water managers and business leaders; we are seen as an honest broker and can therefore convene diverse groups. The AWS Standard is just one initiative and together with our water stewardship programme, we have been able to achieve results and make an impact in key places - including disseminating information to and leveraging other companies and investors.

For priority WWF publications on footprint, water risk, public policy guidelines, and collective action, visit http://wwf.panda.org/what_we_do/how_we_work/conservation/freshwater/water_management/

Side Note 7. GIZ's Water Futures Partnership

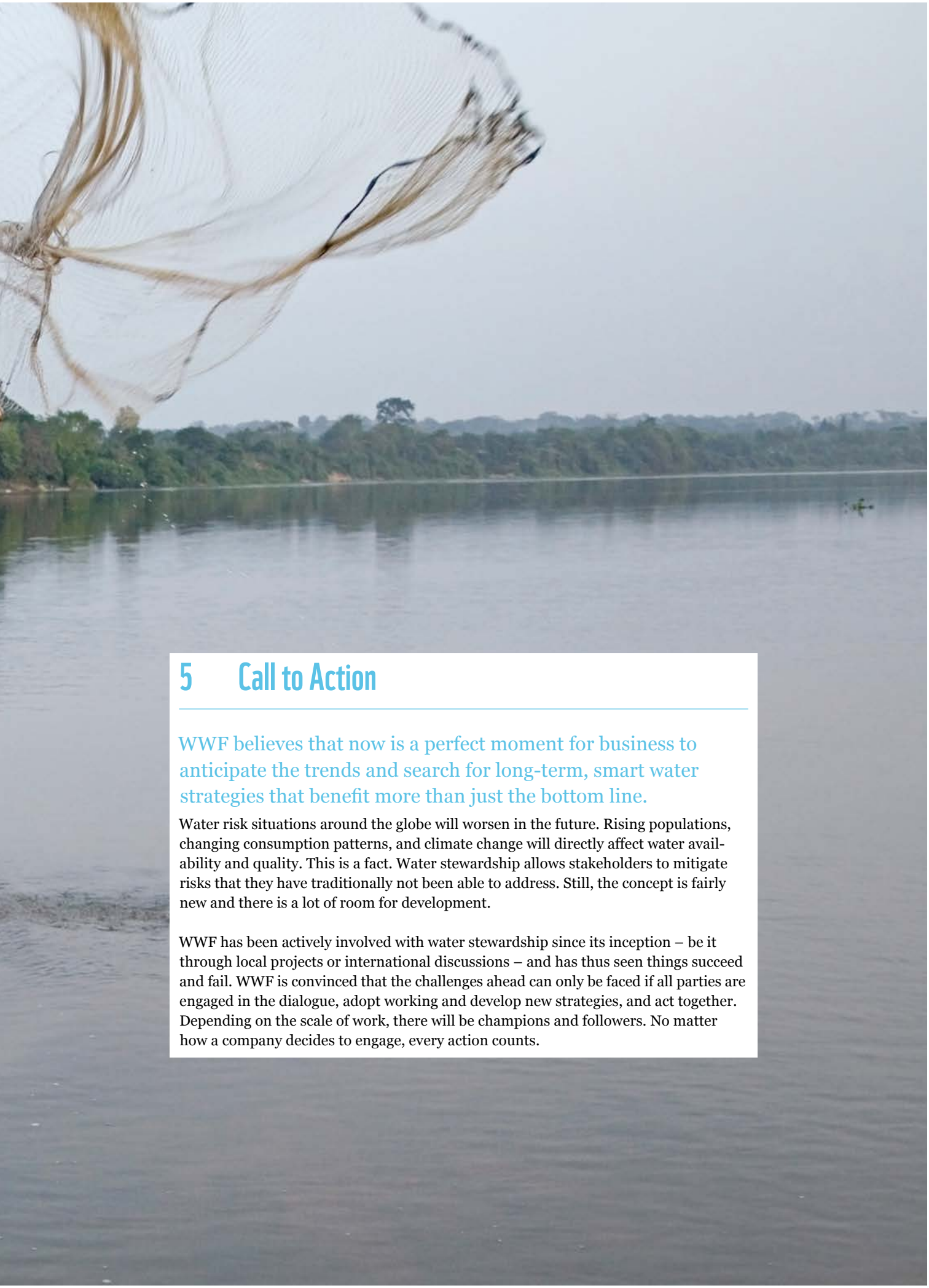
In many of the countries it works in, GIZ[L] considers water risks to be largely a consequence of governance problems. Good water management regimes can help society adapt to ensure a sustainable water supply-demand balance. In GIZ's view, while many companies are taking steps to reduce their water impacts and address reputational risks, many are missing the opportunity to address the causes of water risks: weak capacity for sustainable water management.

Through the Water Futures Partnership, a strategic alliance between SABMiller, WWF, GIZ (on behalf of BMZ), EDEKA, The Nature Conservancy, and the BMZ/DFID-funded International Water Stewardship Programme, GIZ supports governments, companies, and civil society organisations to partner in order to catalyse improvements in water use, management capacity, and governance. GIZ helps to coordinate partnerships, commissions participatory water risk assessments, and develops multi-stakeholder action plans. It focuses on helping partnerships find the most strategic interventions, while leveraging resources and building the capacity of actors to develop and implement their own solutions.

For example, in South Africa, GIZ is partnering with Sasol, the Emfuleni municipality, Department of Water Affairs, and the transboundary basin office ORASECOM to reduce abstractions from the highly stressed Vaal River system. While Sasol has made years of on-site investments to improve water efficiency, the upstream Emfuleni municipality lost 44% of its water before it was paid for by customers. GIZ supported Sasol in redirecting its investments to help reduce water losses in Emfuleni. Water Conservation Warriors in distinctive uniforms raised awareness and local plumbers repaired water leaks. With about €1 million, 2 million m³ of water were saved, avoiding 5% of the total municipal losses in one-third (68.000) of the households. The savings of around €800,000 in the first year alone are being used to scale up the project to another 49,000 households.

GIZ believes that businesses wanting to address their water risks at the watershed level should partner with a locally trusted broker and water sector specialist to understand how they can make the most strategic intervention to catalyse change with the limited resources they have. German companies could be facing substantial water risks through their imports. Building on GIZ's existing partnerships with WWF and other companies, GIZ sees a substantial opportunity for German companies to join initiatives like the Water Futures Partnership in order to address water risks in their value chains, bringing German technologies and good water management practices to the areas where companies are being affected the most.

L GIZ is the German International Cooperation Agency, a publically owned company. It provides technical assistance to governments to build capacity and support reforms in sectors like water, agriculture, energy, health, natural resources and financial governance.



5 Call to Action

WWF believes that now is a perfect moment for business to anticipate the trends and search for long-term, smart water strategies that benefit more than just the bottom line.

Water risk situations around the globe will worsen in the future. Rising populations, changing consumption patterns, and climate change will directly affect water availability and quality. This is a fact. Water stewardship allows stakeholders to mitigate risks that they have traditionally not been able to address. Still, the concept is fairly new and there is a lot of room for development.

WWF has been actively involved with water stewardship since its inception – be it through local projects or international discussions – and has thus seen things succeed and fail. WWF is convinced that the challenges ahead can only be faced if all parties are engaged in the dialogue, adopt working and develop new strategies, and act together. Depending on the scale of work, there will be champions and followers. No matter how a company decides to engage, every action counts.

5.1 Companies – become good water stewards!

Companies ultimately bear the consequences of water-related risks. At the same time, they are also able to mitigate these risks, either in their direct operations or by setting standards along their supply chains. Many companies have already recognised water as a strategic resource to their business and have begun to develop and implement specific water stewardship strategies.

To become good water stewards, German companies should:

» **Identify their risks, impacts, and responsibilities** related to water. Water risks for German companies are mainly located in other countries, thus understanding their supply chains and specific risk situation will be the first step towards risk mitigation – you can't manage what you can't measure. Additionally, it is important to share knowledge about local water problems with other stakeholders.

» **Develop sector-specific solutions** (e.g. guidelines, tools) with other companies to mitigate risks and implement them into their internal processes. For example, in the food sector, one sourcing criteria for the selection of animal and plant fat producers could be the adherence to water management standards.

» **Reduce their water risks by developing and implementing company-specific water stewardship strategies** (e.g. see chapter 4) together with scientists, NGOs, government agencies, and other stakeholders. Some industries have already developed sector-specific guidance on water stewardship, like the IPIECA Water Management Framework's standards[184] for oil and gas companies, ICMM's Water Stewardship Framework[M], or the BSR Standard[N] in apparel production.

» **Engage in collective action** for sustainable water management together with regional and local stakeholders in river basins at risk. For example, food producers,textile producers and retailers should locally engage with farmers and develop sustainable sourcing solutions. The extractives sector should engage with mining operators to reduce their impact on local water resources and quality (e.g. spills on site and along pipelines, toxic wastewater leakages).

M http://www.icmm.com/water
N https://www.bsr.org/reports/awqwg/BSR_AWQWG_Guidelines-Testing-Standards.pdf

5.2 Investors and financial institutions – scrutinise and engage with risky clients!

It is a core interest of investors to manage and mitigate water-related risks across their investment portfolio. This includes engaging with portfolio companies on their water-related risks or embedding proper water risk strategy assessment as a cornerstone in financing decisions. Pushing portfolio companies or clients to mitigate water-related risks and the associated impacts is of great importance in order to ensure the financial performance of those investment portfolios, loan books, and other forms of related financial service.

In order to successfully manage water-related risks across their portfolios, investors should above all engage with their clients to break the business as usual trend. As described in chapter 3.2.6, the financial services sector is very diverse and strategies dealing with risk analysis and mitigation must still be developed in many branches.

To become good water stewards, investors and financial institutions should:

» **Develop standards and policies for water risk analysis and impacts** in their internal decision-making processes
» **Systematically assess investment and financing options** and assets for water-related risks
» **Develop standardised company and asset-based water risk disclosures and engage with company management boards** in order to enhance risk management (such as CDP and GRI)
» **Include water-related risks in overall asset and credit risk estimations.** Specific investment and credit policies relating to water often only focus on reducing reputational risk
» **Develop methodologies to translate water-related risks** to business value at risk in cooperation with businesses and integrate such metrics into financial decisions. Quantifying value at risk from water scarcity and quality is a crucial point for decision-making[185]
» **Develop sector-specific sustainable water risk reduction strategies** to address and provide technical assistance for risky clients and/or investments to ultimately mitigate risks together with strategic stakeholders on the ground
» **Adhere to initiatives** such as the Equator Principles[O] or the UNEP Financial Initiative's[P] water stewardship scheme and develop industry-specific codes of practice when necessary
» **Exclude clients** from their portfolios that do not appropriately address and manage water-related risks after actively engaging with them on a regular basis
» **Disclose their water risk exposure and demonstrate water risk mitigation actions publicly**
» **Proactively support companies** that are seeking to reduce water-related risks (i. e. reward water stewardship in the market place)

O http://www.equator-principles.com/
P http://www.unepfi.org/

5.3. Government – initiate and collaborate!

With the Water Framework Directive (EU-WFD), the European Union has consistent and sustainable water legislation. However, the German government has to face the fact that the products consumed in Germany are often produced with resources that originate from countries and basins around the world with high water-related risks. This connection both presents a business case for the German economy as well as a call to action to be a responsible country.

Outside of the German government's jurisdiction, water risk is often shared between partner governments and German companies. These governments often fail to establish a link between business risks and issues such as land deals, trade policy, and regulatory failure. Out-of-date or poorly enforced public policy in these countries and weak water management institutions often increases water-related risks for everyone - including those at the end of the line who profit economically from these countries.

To become a good water stewards, the German government should:

» **Engage with governments** (also beyond development aid) in selected high water risk countries and river basins that are important to German trade and consumption and develop a deeper understanding of the economic importance of water in local river basins. Support the development and implementation of meaningful catchment management plans. Make sure to include all relevant stakeholders of the economy, civil society (including indigenous people), and NGOs. Ensure that traditional knowledge is integrated into management solutions.
» **Collaborate with key businesses** on shared risk and collective action linked to water basins at risk that are important to the German economy.
» **Deliver on Germany's international commitment as a Party to the UN Convention on Biological Diversity** (CBD) and ensure that the Aichi Targets that particularly address water risks are met by 2020:
    - sustainable production and consumption (Target 4),
    - sustainable management in agriculture, aquaculture, and forestry (Target 7),
    - pollution (Target 8),
    - ecosystem services (Target 14),
    - ecosystem resilience (Target 15).
» **Introduce water risk analysis and water stewardship targets** into the core processes addressed by the German Resource Efficiency Programme (ProgRess) in order to ensure the responsible and efficient use of natural resources related to the German economy.
» **Develop mandatory sustainable water criteria** related to sourcing in countries with high water-related risks. Engage with companies in this process in order to better interpret and understand what companies are doing and thinking. This will ultimately also benefit companies themselves.
» **Introduce the same criteria to public procurement processes.**

5.4 Consumers – demand better!

Often unaware of their power, consumers can demand sustainable choices from companies. They have the power to push companies on who they buy and are supplied from, who they invest in, and to take water seriously. There should be no doubt on which options are sustainable for consumers. They can help focus the debate from how much water a company uses to whether they are acting responsibly.

To become good water stewards, consumers should:

» **Inform themselves about the origin of products** and their associated water issues
» **Demand sustainable solutions** for all products and and adapt their purchase decision
» **Demand transparency** from companies through various channels (including point-of-sale)
» **Demand companies only source sustainable goods** rather than forcing consumers to choose what is sustainable
» **Support government and company action on water stewardship** as citizens

Annex: Sector Water Risk Data

To identify relevant economic sectors and their top ten countries of import origin, 2012 baseline import data (economic sectors, import country of origin, import value and import volume; accessed September 2013) from Germany's Federal Statistical Office[Q, R] was initially analysed.

Relevant economic sectors and import country information was analysed with the WWF Water Risk Filter[S], which assesses business-related water risks for 32 sectors and produced results consisting of two parts – basin- and facility-related risks. Basin-related risk results are based on 19 location-specific risk indicators within a framework of physical, regulatory, and reputational water risk categories. The facility-related risk assessment follows the same framework as the basin-related assessment. It consists of a questionnaire that focuses on a facility's direct operations as well as information on water intensity and pollution related to the sector chosen for the assessment. Only the general sector information was used in this study to provide information on the sector of interest.

Depending on the industry and in order to account for industry specific water risk exposure, the risk weightings vary between different risk categories (physical, regulatory, reputational). All weightings per industry can be found on the Water Risk Filter's website[T]. Risk scores varied between 1 (no/low risk) and 5 (very high risk)[U]. Countries with medium to high or maximum physical water risk (scarcity) and the overall water risk of a specific industry for the origin countries were identified and calculated against the weighted average by import volume (tonnes) of the top 10 importing countries. For example, if a sector's top importing country by volume represents 80% of the top ten countries' import volume, its risk score has an 80% weighting within the top ten average to calculate the industry specific basin risk.

Direct water intensity and the supply chain water intensity were ranked based on the range of the sector's minimum and maximum values. Water pollution was based on the highest ranks of three measures – ecotoxicity, eutrophication, and acidification[V].

Q In general: Foreign trade statistics GP2009-30 (2-Steller) – code: 51000-0007, year 2012
R For agriculture: Warentzollnummer (8-Steller), 2012
S www.waterriskfilter.org
T see: http://waterriskfilter.panda.org/en/Assessment#WaterRiskAssessmentTab/facility/992
U Categories: Low Risk = 1 – 2.249; Medium Risk = 2.25 – 3.49; High Risk = 3.5 – 5
V see: http://www.sustainabilityconsortium.org/

Key methodological issues

How the data reflects re-exports

For all sectors presented, top import countries may include countries that are not the origin of the respective goods or commodity. In these cases, a country imports goods and then re-exports them without further processing. For example, the Netherlands is a major re-exporter for the EU, which can be found in the textiles, mineral, agriculture, and chemical sectors.

Risk score differences

Possible differences in risk scores related to regulatory risks between EU countries are based on results of the indicators (such as enforcement of regulation) found in the Water Risk Filter.

The Water Risk Filter Tool

Detailed information about the risk categories, data sets, and the weightings used to assess data in this report with the Water Risk Filter online tool can be found at www.waterriskfilter.org. The underlying water risk assessment methodology and respective data sets are regularly reviewed and updated to provide the user with the best up-to-date information available. The methodology has been tested by various organisations from the corporate, public, and financial sector to ensure coverage of all relevant water issues (represented through identified individual risk indicators within the physical, regulatory, and reputational risk categories), which can bear financial risk to a company's operation.

Top 10 countries with high water-related risks for Germany's 33 main economic sectors
(based on 2012 import data from Germany's Federal Statistical Office and WWF's Water Risk Filter calculations) High ■ Medium ■ Low ■

Sector	TOTAL import value (€ m)	TOTAL import volume (1,000 tonnes)	Country 1	Physical risk	Regulatory risk	Reputational risk
Basic metals	70,834	32,507	Netherlands			
Agriculture (plant)	31,335	28,359	Netherlands			
Paper & paper products	18,217	17,066	Sweden			
Other mining & quarrying products	1,939	23,548	Netherlands			
Fisheries (aquaculture)	595	163	Norway			
Tobacco products	1,318	1,025	Netherlands			
Energy	2,958	--	France			
Coal & lignite	5,860	43,198	USA			
Chemicals & chemical products	92,368	41,808	Netherlands			
Crude petroleum	76,388	92,278	Russia			
Food products	49,901	29,471	Netherlands			
Coke & refined petroleum products	38,321	29,821	Netherlands			
Other goods	80,358	42,949	Netherlands			
Natural gas	49,036	93,331	Norway			
Beverages	6,653	5,745	Italy			
Agriculture (animal)	1,136	1,434	Denmark			
Machinery & equipment n.e.c.	88,162	6,060	Italy			
Metal ores	10,469	43,318	Brazil			
Wearing apparel	32,970	1,172	China			
Textiles	12,400	1,623	China			
Leather	12,231	551	China			
Computer, electronic & optical products	112,756	1,761	China			
Motor vehicles, trailers & semi-trailers	104,409	9,540	France			
Electrical equipment	55,830	3,810	China			
Pharmaceutical products	49,393	694	USA			
Other transport equipment	43,979	2,460	France			
Rubber & plastic products	32,301	5,665	Italy			
Fabricated metal products, except machinery & equipment	30,323	5,721	China			
Furniture	12,352	3,080	Poland			
Other non-metallic mineral products	11,026	10,055	China			
Wood & of products of wood & cork, except furniture; articles of straw & plaiting materials	6,802	5,293	Austria			
Fisheries (ocean)	4,507	1,061	Poland			
Forestry	816	5,003	Czech Rep.			

	Country 2	Physical risk	Regula-tory risk	Repu-tational risk	Country 3	Physical risk	Regula-tory risk	Repu-tational risk	Sector
	Belgium				Italy				Basic metals
	Spain				Brazil				Agriculture (plant)
	Finland				Austria				Paper & paper products
	China				Norway				Other mining & quarrying prod.
	Denmark				Netherlands				Fisheries (aquaculture)
	China				Norway				Tobacco products
	Czech Rep.				Denmark				Energy
	Russia				Australia				Coal & lignite
	Belgium				France				Chemicals & chemical products
	UK				Libya				Crude petroleum
	France				Belgium				Food products
	Belgium				Russia				Coke & refined petroleum prod.
	France				Italy				Other goods
	Russia				Netherlands				Natural gas
	France				Spain				Beverages
	Australia				Belgium				Agriculture (animal)
	China				Japan				Machinery & equipment n.e.c.
	Canada				Sweden				Metal ores
	Bangladesh				Turkey				Wearing apparel
	Italy				Turkey				Textiles
	Italy				Vietnam				Leather
	USA				Japan				Computer, electronic, optical prod.
	Czech Rep.				Spain				Motor vehicles, trailers & semi-trailers
	Czech Rep.				Italy				Electrical equipment
	Switzerland				Netherlands				Pharmaceutical products
	USA				UK				Other transport equipment
	France				China				Rubber & plastic products
	Italy				Czech Rep.				Fabricated metal products, except machinery & equipment
	China				Italy				Furniture
	Italy				France				Other non-metallic mineral prod.
	Poland				China				Wood & of products of wood & cork, except furniture; articles of straw & plaiting materials
	China				Netherlands				Fisheries (ocean)
	Poland				Netherlands				Forestry

Top 10 countries with high water-related risks for Germany's 33 main economic sectors
(based on 2012 import data from Germany's Federal Statistical Office and WWF's Water Risk Filter calculations) High ■ Medium ■ Low ■

Sector	Country 4	Physical risk	Regulatory risk	Reputational risk	Country 5	Physical risk	Regulatory risk	Reputational risk
Basic metals	Austria	■	■	■	France	■	■	■
Agriculture (plant)	France	■	■	■	Italy	■	■	■
Paper & paper products	France	■	■	■	Poland	■	■	■
Other mining & quarrying prod.	Austria	■	■	■	USA	■	■	■
Fisheries (aquaculture)	France	■	■	■	UK	■	■	■
Tobacco products	Austria	■	■	■	USA	■	■	■
Energy	Austria	■	■	■	Switzerland	■	■	■
Coal & lignite	Colombia	■	■	■	Canada	■	■	■
Chemicals & chemical products	USA	■	■	■	UK	■	■	■
Crude petroleum	Norway	■	■	■	Netherlands	■	■	■
Food products	Italy	■	■	■	Poland	■	■	■
Coke & refined petroleum prod.	UK	■	■	■	USA	■	■	■
Other goods	Austria	■	■	■	USA	■	■	■
Natural gas	UK	■	■	■	Belgium	■	■	■
Beverages	USA	■	■	■	Austria	■	■	■
Agriculture (animal)	France	■	■	■	Mexico	■	■	■
Machinery & equipment n.e.c.	France	■	■	■	Switzerland	■	■	■
Metal ores	South Africa	■	■	■	Peru	■	■	■
Wearing apparel	India	■	■	■	Italy	■	■	■
Textiles	Netherlands	■	■	■	Poland	■	■	■
Leather	India	■	■	■	Indonesia	■	■	■
Computer, electronic, optical prod.	Netherlands	■	■	■	Czech Rep.	■	■	■
Motor vehicles, trailers & semi-trailers	Austria	■	■	■	Italy	■	■	■
Electrical equipment	Switzerland	■	■	■	Hungary	■	■	■
Pharmaceutical products	Ireland	■	■	■	UK	■	■	■
Other transport equipment	China	■	■	■	Korea	■	■	■
Rubber & plastic products	Poland	■	■	■	Netherlands	■	■	■
Fabricated metal products, except machinery & equipment	Austria	■	■	■	Switzerland	■	■	■
Furniture	Czech Rep.	■	■	■	Hungary	■	■	■
Other non-metallic mineral prod.	USA	■	■	■	Poland	■	■	■
Wood & of products of wood & cork, except furniture; articles of straw & plaiting materials	Czech Rep.	■	■	■	Russia	■	■	■
Fisheries (ocean)	Norway	■	■	■	Denmark	■	■	■
Forestry	France	■	■	■	Belgium	■	■	■

	Country 6	Physical risk	Regula-tory risk	Repu-tational risk	Country 7	Physical risk	Regula-tory risk	Repu-tational risk	Sector
	Switzerland				Russia				Basic metals
	USA				Vietnam				Agriculture (plant)
	Italy				Netherlands				Paper & paper products
	France				UK				Other mining & quarrying prod.
	Greece				Italy				Fisheries (aquaculture)
	France				UK				Tobacco products
	Sweden				Netherlands				Energy
	Poland				South Africa				Coal & lignite
	Switzerland				Italy				Chemicals & chemical products
	Nigeria				Kazakhstan				Crude petroleum
	Austria				Denmark				Food products
	Poland				France				Coke & refined petroleum prod.
	UK				China				Other goods
	Qatar				France				Natural gas
	Denmark				UK				Beverages
	Austria				USA				Agriculture (animal)
	USA				Austria				Machinery & equipment n.e.c.
	Australia				Argentina				Metal ores
	Netherlands				Vietnam				Wearing apparel
	India				Switzerland				Textiles
	Portugal				Netherlands				Leather
	Switzerland				Taiwan				Computer, electronic, optical prod.
	Hungary				UK				Motor vehicles, trailers & semi-trail-ers
	France				Poland				Electrical equipment
	France				Italy				Pharmaceutical products
	Japan				Austria				Other transport equipment
	Czech Rep.				Switzerland				Rubber & plastic products
	Poland				Netherlands				Fabricated metal products, except machinery & equipment
	Austria				Turkey				Furniture
	Belgium				Czech Rep.				Other non-metallic mineral prod.
	France				Finland				Wood & of products of wood & cork, except furniture; articles of straw & plaiting materials
	USA				Peru				Fisheries (ocean)
	Austria				Norway				Forestry

Top 10 countries with high water-related risks for Germany's 33 main economic sectors
(based on 2012 import data from Germany's Federal Statistical Office and WWF's Water Risk Filter calculations) High ■ Medium ■ Low ■

Sector	Country 8	Physical risk	Regulatory risk	Reputational risk	Country 9	Physical risk	Regulatory risk	Reputational risk
Basic metals	UK	■	■	■	Poland	■	■	■
Agriculture (plant)	Poland	■	■	■	Côte d'Ivoire	■	■	■
Paper & paper products	Switzerland	■	■	■	Brazil	■	■	■
Other mining & quarrying prod.	Belgium	■	■	■	Italy	■	■	■
Fisheries (aquaculture)	Spain	■	■	■	Indonesia	■	■	■
Tobacco products	Belgium	■	■	■	Italy	■	■	■
Energy	Poland	■	■	■			■	■
Coal & lignite	Netherlands	■	■	■	Belgium	■	■	■
Chemicals & chemical products	Ireland	■	■	■	China	■	■	■
Crude petroleum	Algeria	■	■	■	Azerbaijan	■	■	■
Food products	Brazil	■	■	■	Switzerland	■	■	■
Coke & refined petroleum prod.	Belarus	■	■	■	Austria	■	■	■
Other goods	Czech Rep.	■	■	■	Poland	■	■	■
Natural gas	Italy	■	■	■	Denmark	■	■	■
Beverages	Netherlands	■	■	■	South Africa	■	■	■
Agriculture (animal)	China	■	■	■	Italy	■	■	■
Machinery & equipment n.e.c.	Czech Rep.	■	■	■	Netherlands	■	■	■
Metal ores	Chile	■	■	■	Mauritania	■	■	■
Wearing apparel	Indonesia	■	■	■	Romania	■	■	■
Textiles	Belgium	■	■	■	Czech Rep.	■	■	■
Leather	France	■	■	■	Slovakia	■	■	■
Computer, electronic, optical prod.	Korea	■	■	■	Malaysia	■	■	■
Motor vehicles, trailers & semi-trailers	USA	■	■	■	Poland	■	■	■
Electrical equipment	Austria	■	■	■	Japan	■	■	■
Pharmaceutical products	Belgium	■	■	■	Spain	■	■	■
Other transport equipment	Italy	■	■	■	Switzerland	■	■	■
Rubber & plastic products	Belgium	■	■	■	Austria	■	■	■
Fabricated metal products, except machinery & equipment	France	■	■	■	USA	■	■	■
Furniture	Slovenia	■	■	■	Romania	■	■	■
Other non-metallic mineral prod.	Austria	■	■	■	Netherlands	■	■	■
Wood & of products of wood & cork, except furniture; articles of straw & plaiting materials	Sweden	■	■	■	Netherlands	■	■	■
Fisheries (ocean)	Vietnam	■	■	■	Thailand	■	■	■
Forestry	Latvia	■	■	■	Denmark	■	■	■

	Country 10	Physical risk	Regulatory risk	Reputational risk	Sector
	Sweden				Basic metals
	Czech Rep.				Agriculture (plant)
	USA				Paper & paper products
	South Africa				Other mining & quarrying prod.
	Iceland				Fisheries (aquaculture)
	South Africa				Tobacco products
					Energy
	UK				Coal & lignite
	Japan				Chemicals & chemical products
	Saudi Arabia				Crude petroleum
	China				Food products
	Finland				Coke & refined petroleum prod.
	Switzerland				Other goods
	Austria				Natural gas
	Belgium				Beverages
	Romania				Agriculture (animal)
	UK				Machinery & equipment n.e.c.
	New Guinea				Metal ores
	France				Wearing apparel
	Austria				Textiles
	Romania				Leather
	Hungary				Computer, electronic, optical prod.
	Slovakia				Motor vehicles, trailers & semi-trailers
	USA				Electrical equipment
	Sweden				Pharmaceutical products
	Poland				Other transport equipment
	UK				Rubber & plastic products
	Taiwan				Fabricated metal products, except machinery & equipment
	Switzerland				Furniture
	Hungary				Other non-metallic mineral prod.
	Switzerland				Wood & of products of wood & cork, except furniture; articles of straw & plaiting materials
	UK				Fisheries (ocean)
	Russia				Forestry

Top 10 countries with high water-related risks for selected agriculture commodities
(based on 2012 import data from Germany's Federal Statistical Office and WWF's Water Risk Filter calculations) High ■ Medium ■ Low ■

Commodity	Soybean	Oil palm	Grapes	Coffee	Banana	Cocoa	Rice	Pineapples	Sugarcane	Citrus
Total import value (€ m)	2,950,185	1,451,715	3,149,932	4,188,746	729,453	3,204,853	327,609	253,416	130,268	350,006
Total import volume (tonnes)	7,001,724	2,128,763	2,081,176	1,261,228	1,182,907	1,167,886	448,490	317,794	312,415	298,054
Country 1	Brazil	Indonesia	Italy	Brazil	Ecuador	Netherlands	Italy	Costa Rica	India	Spain
Phys. risk										
Reg. risk										
Rep. risk										
Country 2	Netherlands	Netherlands	Spain	Vietnam	Colombia	Ivory Coast	Netherlands	Thailand	Swaziland	China
Phys. risk										
Reg. risk										
Rep. risk										
Country 3	USA	Malaysia	France	Honduras	Costa Rica	Belgium	Belgium	South Africa	Brazil	Netherlands
Phys. risk										
Reg. risk										
Rep. risk										
Country 4	Argentina	New Guinea	South Africa	Peru	DomRep	Indonesia	Spain	Netherlands	Denmark	Italy
Phys. risk										
Reg. risk										
Rep. risk										
Country 5	Paraguay	Thailand	Chile	Ethiopia	Peru	Ghana	India	Indonesia	Australia	Argentina
Phys. risk										
Reg. risk										
Rep. risk										
Country 6	Canada	Honduras	USA	Indonesia	Brazil	France	Cambodia	Panama	Poland	Turkey
Phys. risk										
Reg. risk										
Rep. risk										
Country 7	Uruguay	Italy	Turkey	Uganda	Ivory Coast	Switzerland	Thailand	Kenya	France	South Africa
Phys. risk										
Reg. risk										
Rep. risk										
Country 8	Austria	Colombia	Greece	India	Panama	Philippines	Uruguay	Ecuador	Austria	Brazil
Phys. risk										
Reg. risk										
Rep. risk										
Country 9	Belgium	Ivory Coast	Australia	China	Chile	Austria	Denmark	Ivory Coast	Netherlands	Uruguay
Phys. risk										
Reg. risk										
Rep. risk										
Country 10	Ukraine	Singapore	Macedonia	Colombia	Honduras	Nigeria	Argentina	Ghana	Mauritius	Israel
Phys. risk										
Reg. risk										
Rep. risk										

Water Intensity and pollution ranking of Germany's 33 economic sectors based on baseline data provided by the Sustainability Consortium. Water intensity (water use per $ unit of production) in direct and supply chain processes per sector considered sub-sector values (e.g. mean values for chemical industrial processes). Very High ■ High ■ Medium ■ Low ■ Very Low ■

Sector	Direct water intensity rank	Supply chain water intensity rank	Water pollution
Basic metals			
Agriculture (plant)			
Paper and paper products			
Other mining and quarrying products			
Fisheries (aquaculture)	n/a	n/a	
Tobacco products			
Energy	n/a	n/a	
Coal and lignite			
Chemicals and chemical products			
Crude petroleum			
Food products			
Coke and refined petroleum products			
Other goods	n/a	n/a	
Natural gas			
Beverages			
Agriculture (animal)			
Machinery and equipment n.e.c.			
Metal ores			
Wearing apparel			
Textiles			
Leather			
Computer, electronic and optical products			
Motor vehicles, trailers and semi-trailers			
Electrical equipment			
Pharmaceutical products			
Other transport equipment			
Rubber and plastic products			
Fabricated metal products, except machinery and equipment			
Furniture			
Other non-metallic mineral products			
Wood + products of wood and cork (except furniture, straw and plaiting materials)			
Fisheries (ocean)	n/a	n/a	
Forestry			

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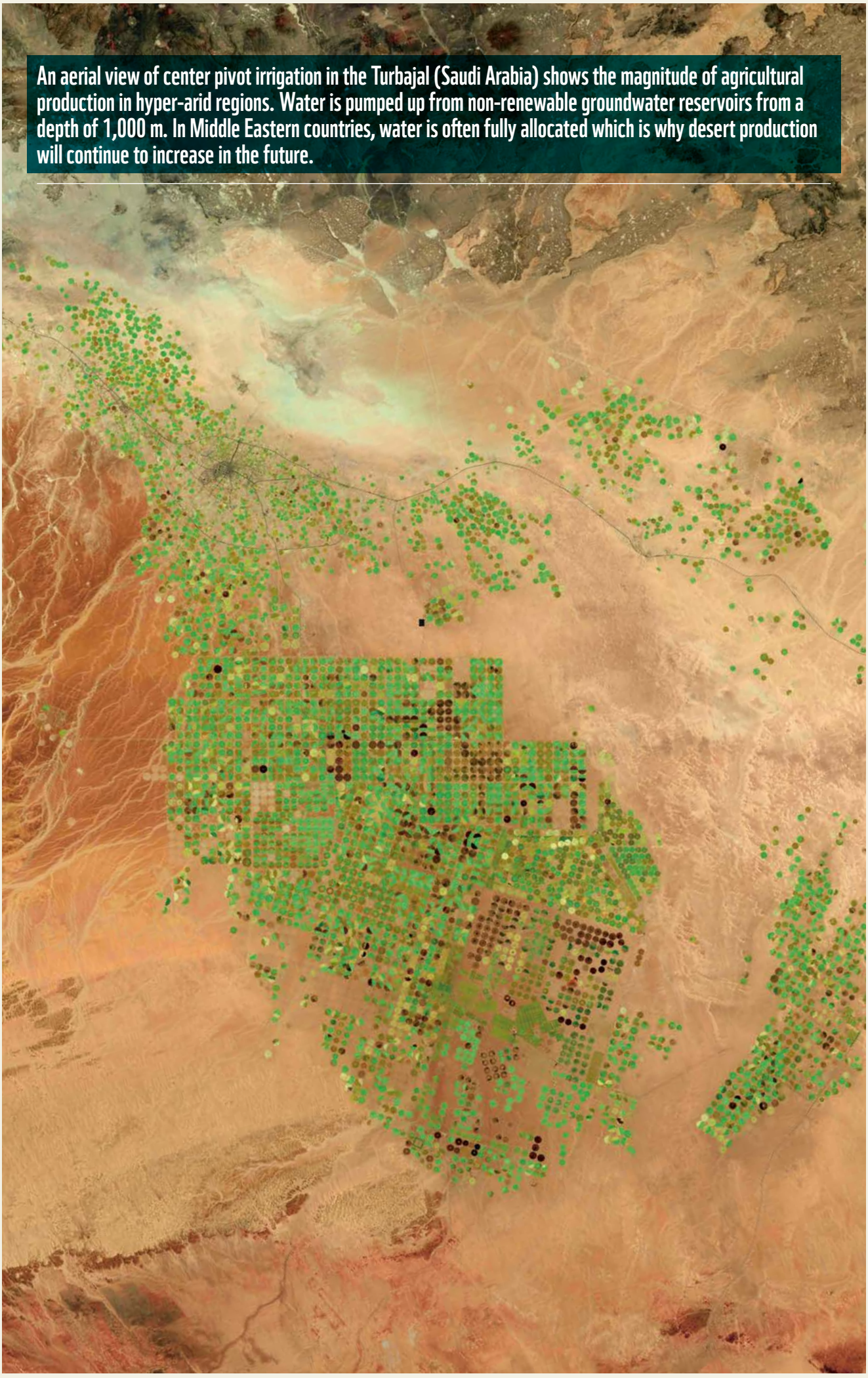

An aerial view of center pivot irrigation in the Turbajal (Saudi Arabia) shows the magnitude of agricultural production in hyper-arid regions. Water is pumped up from non-renewable groundwater reservoirs from a depth of 1,000 m. In Middle Eastern countries, water is often fully allocated which is why desert production will continue to increase in the future.

Extensive agricultural production can also be seen in Europe (here in southern Spain). Irrigation water mainly comes from groundwater resources that are overused and poorly managed. Southern Spain is the vegetable garden for nothern Europe - so the problem reaches Germany's doorstep as well.

100 % RECYCLED

37 Percent

Global freshwater ecosystem health declined by 37% between 1970 and 2008 – more than for any other biome 13.

2,500 Liter

The global average it takes to produce one t-shirt is 2,500 litres of water. The supply chain is often connected to countries like China, India, Pakistan, Turkey or Uzbekistan – countries with high water risks.

3rd Place

In 2012, Germany was the third biggest import nation worldwide – with a population of 80 million people.

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