



WORKING  
TOGETHER  
FOR A GREEN  
TEXTILE  
SECTOR  
IN VIETNAM



TOMMY HILFINGER

HSBC | Water Programme

REPORT

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# Textile and Garment Sector in Vietnam: Water Risks and Solutions

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The findings and conclusions in this report represent the views of WWF and Vietnam Textile and Apparel Association and its research partners. It does not represent the views of HSBC or Tommy Hilfiger, or any of their affiliates.

# List of abbreviations

<b>CIF</b>	cost, insurance and freight
<b>CMT</b>	cut make and trim
<b>CPTPP</b>	The Comprehensive and Progressive Agreement for Trans-Pacific Partnership
<b>CSR</b>	Corporate Social Responsibility
<b>DARD</b>	Departments of Agriculture and Rural Development
<b>DOC</b>	Departments of Construction
<b>DOIT</b>	Departments of Industry and Trade
<b>DONRE</b>	Departments of Natural Resources and Environment
<b>DOPI</b>	Departments of Planning and Investment
<b>DWRM</b>	Department of Water Resources Management
<b>EIA</b>	environmental impact assessment
<b>ETP</b>	effluent treatment plants
<b>EVFTA</b>	EU-Vietnam Free Trade Agreement
<b>FDI</b>	Foreign Direct Investment
<b>FOB</b>	free on board
<b>FTA</b>	Free Trade Agreements
<b>GIWP</b>	General Institute of Water Resources and Hydropower Planning and Design
<b>IP</b>	industry parks
<b>IWRM</b>	integrated water resource management
<b>LEP</b>	Law on Environmental Protection
<b>LWR</b>	Law on Water Resources
<b>MARD</b>	Ministry of Agriculture and Rural Development
<b>MNC</b>	multinational corporations
<b>MOC</b>	Ministry of Construction
<b>MOIT</b>	Ministry of Industry and Trade
<b>MONRE</b>	Ministry of Natural Resources and Environment
<b>MPI</b>	Ministry of Planning and Investment
<b>OBM</b>	original brand manufacturer
<b>ODM</b>	original design manufacturing
<b>RTTT</b>	Race to the Top
<b>SDGs</b>	Sustainable Development Goals
<b>SME</b>	small and medium-sized enterprises
<b>VAWR</b>	Vietnam Academy for Water Resources
<b>VCCI</b>	Vietnam Chamber of Commerce and Industry
<b>VCOSA</b>	Vietnam Cotton and Spinning Association
<b>VEA</b>	Vietnam Environment Administration
<b>VITAS</b>	Vietnam Textile and Apparel Association
<b>VITAS</b>	Vietnam Textile and Apparel Association
<b>ZHDC</b>	Zero Discharge of Hazardous Chemicals
<b>ZLD</b>	zero liquid discharge

# Executive Summary

This report provides an insight into the water risks facing textile mills and garment manufacturers in Vietnam and the opportunities that appear to be available for mitigating such risks.

The report examines Vietnam's textile sector and water risks, in order to identify the specific water risks potentially impacting the country's textile and garment sector within the next five years. Based on this, the report outlines opportunities for mitigation through actions that may be undertaken by WWF as well as other Vietnamese textile industry stakeholders (including factories, other NGOs, brands, government entities and other enabling organisations including development agencies, donors, and investors). The report focuses not only on textile production (including the spinning, weaving and knitting, dyeing, and finishing stages) but also on garment manufacturing (including wet processing).<sup>1</sup>

The study's methodology involved undertaking a desktop review followed by a fact-finding mission within Vietnam to explore current and potential water risks, textile sector stakeholders' awareness of water issues, and stakeholder preparedness to manage their water-related risks.

The report presents an overview of Vietnam's textile and garment sector; an outline of the country's water resources and water governance management context; an analysis of the water risks relevant to the textile and garment sector in Vietnam; stakeholders' awareness or views of those risks; and a roadmap for addressing water risks by WWF in partnership with policy makers / users, textile brands / factories and other key stakeholders that are important enablers of Vietnam's textile and garment sector.

## Vietnam's textile and garment sector

Vietnam's textile and garment industry has long been a crucial sector to the Vietnamese economy and one of the key export products. Its important role as a driver of economic growth is demonstrated by the total export value of textile and garment products. Rising to US\$ 31.2 billion in 2017, it accounts for 15% of the country's 2017 total export values, making the industry's product the top Vietnamese export. The sector employs more than 3 million labourers and enjoys a steady export growth rate of around 12% per year during 2010 – 2017. Approximately 85% of the sector's labourers work for garment factories which are known as "labour intensive" and generally small in size- 64% of factories having less than 50 labours- with low technology equipment and working as outsourced processing contractors. The sector now has around 7,000 factories, 84% of which are owned by the private sector. 70% of the factories are garment factories. The majority of the factories, 62%, are located

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<sup>1</sup> Wet process engineering is one of the major streams in textile engineering which refers to the process of textile chemicals engineering and a few different aspects of applied sciences in this

in the South, another 30% are in the North, and the remaining 8% of factories are located in the Central and other regions.

Wet processing carries the most impactful environmental footprint of the textile sector as it uses intensive freshwater abstraction for bleaching/washing, dyeing, and finishing processes. These, in turn, generate and discharge a large volume of wastewater and use a large amount of chemicals, aside from the extensive use of high energy for heating water and steam generation.

At this time, there are no official figures available to confirm the quantity of water used by Vietnam's textile and garment industry. However, data indicates that in 2003 the volume of wastewater produced by the textile sector ranked seventh of the top eight wastewater producing industries accounting for 3% of the total waste water discharge volume. Notably, the data also showed that the sector's investment to treat waste water only accounted for 1% of the total investment of the eight industries. This may suggest that the textile industry was under-investing in wastewater treatment compared to other industries at that time.

As required by Environmental Protection Law, larger non-dyeing weaving factories and all washing and bleaching processes are required to conduct Environmental Impact Assessments and to report the results of environment protection work to local authorities. Larger factories are also required by law to treat their domestic wastewater. The wastewater discharge of the textile and garment industry has to comply with the receiving water stated in the national technical regulations and standards. Factories still experience difficulties in meeting those standards because of the limited understanding of the prevailing regulations and the cost in investing and maintaining effluent treatment plants (ETPs). Failure in complying with the country's mandatory requirements for the sector, however, will exacerbate the water pollution problem in Vietnam as well as pose a significant potential reputational risk for the textile and garment sector as a whole.

## Vietnam's water resources

Vietnam's climate and hydrologic characteristics vary spatially, across the length and breadth of the country. The seasonal distribution of water resources is also highly variable during the year, owing to the unevenly distributed monsoon rainfall which results in devastating floods occurring in the wet season and extreme low flows and drought conditions in the dry season.

The upstream water quality of most rivers appears to be relatively good, however, pollution (mainly from urban areas and intensive industrial development) is seriously affecting the water quality of major rivers' downstream sections, especially those near outlets from factories. Primary pollution indicators show that water quality problems are generally worst during the dry season, when the flows in the rivers are reduced.

Although relatively abundant, groundwater is exploited beyond sustainable levels in parts of the country, including in the Red River and Mekong River Deltas areas- particularly around Hanoi and Ho Chi Minh City. This results in increased salinity

intrusion, which poses a threat to the safe water supply in both areas. There is also evidence of local groundwater pollution from poorly maintained septic tanks, garbage dumping, industrial effluents, and overexploitation.

More than 60 percent of surface water is generated in other riparian countries due to Vietnam being the farthest downstream nation of its two most significant rivers, the Mekong and Red River systems. This means that Vietnam's hydrology is especially vulnerable to the water management and development decisions (including, for example, existing and planned transboundary dams) of the upstream countries through which these rivers flow.

## Vietnam's water governance framework

Vietnam's water governance framework is subject to ongoing development and refinement, although it's still fragmented and inconsistent in application. There are numerous laws and regulations that include provisions relevant to the management of water and wastewater in Vietnam, sometimes with differing legal viewpoints or policy objectives. Regulatory responsibilities for water and wastewater planning, monitoring, and enforcement are shared across numerous government agencies and across different levels of government.

## Water risks and Vietnam's textile and garment sector

Water risks were categorised into physical, governance/regulatory, reputational, and transboundary water-related risks; and assessed in terms of their implications for the textile sector.

### Physical risks, and their impacts on the textile sector, included:

- Shortages in surface water supplies occurring during dry season drought events – textile factories that rely on surface water as their main source may have their supplies restricted or interrupted during periods of prolonged and/or severe drought;
- Available supplies of acceptable quality groundwater may be potentially inadequate to sustain the needs of agriculture, food production, urban populations, and industry – Textile factories that rely on groundwater as their main supply may be forced to switch to other sources of water;
- On-going deterioration in surface water quality due to pollution of Vietnam's water supplies – poor surface water quality may have an impact on local community health and lead to stricter controls being imposed on the operations of textile factories; and
- Flooding and the associated major local or widespread loss of life or livelihoods, property damage, adverse impacts to utility services, and physical



loss of access to communities and businesses – such major (unusual) flooding events may disrupt textile factory operations.

**Water governance and regulatory related risks, and their impacts on the textile sector, included:**

- Governance and regulatory water resource management and planning frameworks are complex; fragmented and administered by overlapping agencies – this creates an uncertain and challenging business investment climate for planning and growing textile factories; and
- Inconsistent or weak water and wastewater-related management, compliance, and enforcement – this leads to high levels of environmental non-compliance by the textile industry and others; it also heightens reputational and water resource related risks for the textile sector.

**Reputational risks, and their impacts on the textiles sector, related to:**

- Non-compliance with environmental regulations by some industries – this may lead to the government implementing stricter regulation of all industries (including textile factories) with loss of business licence to operate and/or loss of buyers.

**Transboundary risks, and their impacts on the textile sector, related to:**

- Suboptimal water development and management decisions in transboundary river basins upstream of Vietnam – this may potentially result in loss of river flows, sediment loads, land, fisheries, agricultural production, livelihoods and food security in Vietnam, destabilise the social-economic environment throughout the region, and the productivity of textile and garment factories.

The report summarises the threats to factories and brands arising from each area of risk, as well as the potential impacts from factories or brands that could exacerbate existing risk areas. The report also assesses stakeholders' level of risk for each category in the next five years, stakeholders' current awareness of each risk area (based on stakeholder comments in interviews), and identified opportunities for mitigating such hazards.

## Strategic roadmap

Section 5 of the report presents a roadmap of 12 recommendations, timeframes, and specific actions for addressing these risks. The recommendations are:

### Short-term:

1. Establish a multi-sector “Lancang-Mekong River Stewardship Collective” to provide input and engage with the six-country Lancang-Mekong Cooperation on river-related risks and opportunities within the investment and development context of the Belt and Road Initiative;
2. Establish a textile sector water partnership (made up of representatives from the major brands operating within Vietnam) to coordinate the sector’s cooperation with the proposed multi-sector collective;
3. Engage textile and garment factories in adopting water saving practices and use efficient management activities to better comply with brands’ requirements, be more environmental friendly, and facilitate comparisons against the environmental performance of other sectors;
4. Conduct capacity building activities to equip relevant stakeholders in the textile and garment industry with necessary knowledge on how to adopt water saving practices;
5. Engage textile and garment factories in adopting best practices in chemical and waste water management to improve surface water quality;
6. Introduce water saving and efficient methods to Industry Parks (IP) to promote collective best-practice water saving and wastewater management actions at the IP level;
7. Support the Vietnamese Government in developing a smart water use program for the textile and garment sector to promote water efficient practices and technology countrywide;

### Medium-term:

8. Publish documents on water use efficiency to share and promote examples of good practices in the textile industry’s water use;
9. Promote national reporting against sector-based standards to demonstrate and promote Textiles’ good performance and reputation in managing wastewater and water quality;
10. Promote knowledge management in water governance to facilitate sector players’ better understanding of policies and standards relevant to water use;



**Long-term:**

11. Develop a smart water use supporting fund to aid and reward textile and garment factories adopting water efficient and clean technology; and
12. Support the Vietnamese Government in developing water governance policy consistent with international standards.

# 1. Introduction

## 1.1 Purpose of the report

This report provides an insight into the water risks facing textile mills and garment manufacturers in Vietnam and the opportunities that appear to be available for mitigating such risks. The report examines Vietnam's textile and garment sector and water risks in turn, identifying the specific water risks that will potentially impact the country's textile sector within the next five years. Based on this, the report outlines opportunities for mitigating these risks through actions that may be undertaken by WWF and Vietnam's textile and garment industry stakeholders (including factories and brands), other NGOs, government entities, enabling organisations (including development agencies, donors, investors, technical organisations), and possibly different industry sectors.

The report focuses not only on textile production (including the spinning, weaving and knitting, dyeing, and finishing stages), but also on garment manufacturing- including wet processing. Wet processing in the textile sector is more popular than wet processing in the garment sector.

## 1.2 Methodology

The study was undertaken by applying the following methodology:

- Completing a desktop review of documentation relating to Vietnam's textile and garment sector, its water management and governance context, as well as the existing and potential water risks facing the country and broader region;
- Preparing for a field visit by identifying key issues and relevant stakeholders; preparing guidance for questioning those stakeholders; and agreeing to an itinerary with WWF as the liaison to in-country textile and garment sector representatives;
- On-ground consultation with key stakeholders; mapping views and conditions on the ground by interviewing government and textile and garment industry stakeholders as well as interacting with local WWF experts;
- Analysing the collected information and preparing a draft report that is structured as follows:
  - **Section 1**-introduces background and how the study was conducted;
  - **Section 2**-presents an overview of Vietnam's textile and garment sector including its outlook and water issues in the sector;
  - **Section 3**-explores water resources management in Vietnam and the potential water risks in general;
  - **Section 4**-synthesises the water risks relevant to the textile and garment sector in Vietnam by drivers of risks including physical, governance, reputational, and



proposes relevant mitigation actions. Transboundary risks will also be analysed due to their likely impact on the textile sites; and

- **Section 5**-a roadmap for addressing water risks by WWF and the textile and garment sector (brands and factories) in partnership with policy makers / users, and other key stakeholders that are important enablers of Vietnam's textile and garment sector.

## 2. Overview of Vietnam's textile and garment sector

### **Main features of Vietnam's Textile and Garment Industry**

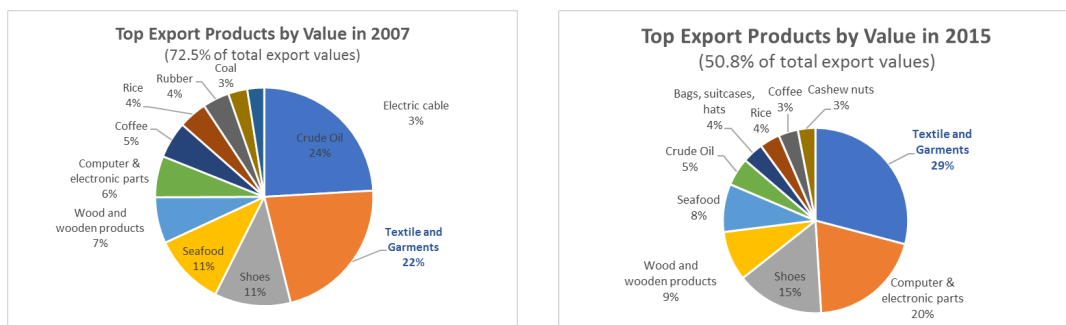
- Textile and Garment industry has always been a sector with a great contribution to the Vietnamese economy in general and particularly, as export industry. Vietnam is among the top five garment exporters in the world. The main export markets of the country from 2007 to 2017 are the United States, the EU, Japan and Korea.
- Vietnam's textile and garment industry is unbalanced. Dyeing and weaving are a bottleneck to the development of the industry.
- Foreign Direct Investment (FDI) enterprises dominate export activities, although they account for only 15% of the total number of factories in the country.
- With fast development, environmental pollution becomes a prominent concern. In order to improve production capacity, reduce waste, and save resources, Vietnamese enterprises need to apply cleaner production solutions to change to sustainable production models.
- The Vietnamese Government focuses their policy and technical support on the textile and garment industry development by taking advantage of free trade agreements (FTA) like the The Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) or the EU-Vietnam Free Trade Agreement (EVFTA). On the other hand, the government should target more support to promote sustainable industry development to achieve long term goal to turn “made in Vietnam” to sustainable “made in Vietnam”.

## 2.1 Economic importance of the textile sector

### Textile and Garment Sector as the Driver of Economic Growth

The textile and garment industry has long been a crucial sector to the Vietnamese economy and one of the key Vietnamese export products. Its important role as a driver of economic growth is affirmed by its large percentage of Vietnam's top export products. In terms of value, the total export value of textile and garment products rose from US\$2.75 billion in 2002 to US\$ 31.2 billion in 2017 (making it the top export product and accounting for 14.5% of total export values for 2017). Among the top Vietnamese export products, the share of textiles and garments increased over the years as the following figure indicates.

**Figure 1. Share of Textiles and Garments as Top Exports**

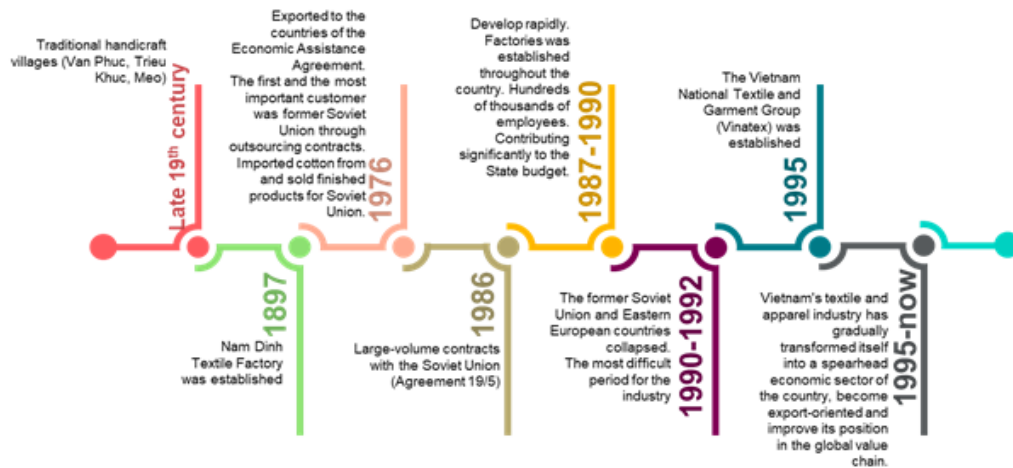


Source: General Statistic Office Vietnam ([www.gso.gov.vn](http://www.gso.gov.vn))

Textile and garment production in Vietnam goes all the way back to the late 19th century when households in traditional craft villages engaged in textile activities. The sector was formally established by the founding of the state-owned Nam Dinh Textiles Company in 1897.

Important milestones of the sector are summarised in the following figure. The sector was invested in by the State and had its first shipment of products in 1976 to the Former Soviet Union, which at the time was the most important economic and political partner of Vietnam. Until early 2000, the sector was largely owned by the state, though private businesses were present. The largest textile and garment corporation, Vinatex, was established in 1995 by the State and was comprised of many already-existing state-owned companies across the country. Around 2002, following the equitization of other state-owned companies in Vietnam, Vinatex's companies were also equitized. Today, Vinatex is 51% owned by the State.

**Figure 2. Timeline of the development of Textile and Garment Sector**



## Vietnam's Textile and Garment Sector today

Now, more than a hundred years later, the textile and garment sector has around 7,000 factories, 84% of which are owned by the private sector. 70% of these factories are garment factories. A majority, 62%, of the factories are located in the South, with another 30% located in the North, and the remaining 8% of factories located in the Central and other regions.

- Garment factories generate 62.31% of the total enterprises in the textile and garment sector. Of the estimated 3 million labourers working for the sector, 85% work for garment factories, which are known to be labour intensive. Vietnamese garment factories are mainly small in size (64% of factories employ less than 50 labours<sup>2</sup>), have low technology equipment and work as outsourced processing contractors for multinational corporations (MNCs).
- Spinning factories account for 16.83% of the total enterprises. Yarn factories are often seen as being larger in size, due to them being equipped with high technology machineries; these factories are more capital intensive than labour intensive.
- The supporting sector is still very limited with only 2.2% of total enterprises.

<sup>2</sup> MULTRAP, 2014



**Figure 3. Classification of Enterprises by capital, by location & by production field**

Criteria	Number of Enterprises
<b>Total</b>	<b>7,154</b>
<b>By Capital</b>	
Joint Stock, Limited Liability and Private Companies	42.5%
FDI	40.3%
Co-operatives	17.2%
<b>By Location</b>	
The Red River Delta	26.01%
Northern Midland & Mountainous Area	3.41%
Northern Central Area & Central Coastal Area	11.18%
Highland	2.11%
South - East Area	42.89%
The Mekong River Delta	14.4%
<b>By Production Field</b>	
Spinning	16.83%
Weaving and Dyeing	18.66%
Garment	62.31%
Supporting Industry	2.2%

Source: MOIT, GSO (2016)

With advantages regarding capital, technology, governance, and widespread distribution network, FDI enterprises are currently dominating the export activities of Vietnam's textile and garment industry. Of about the 7,000 factories in operation nationwide, FDI factories - accounting for only 15% of the total factories in the sector- already dominate the import of materials and the export of finished products.

By the year of 2017, FDI sector contributed 62.04% to Vietnam's total export (garment, fabric, fibre and yarn).

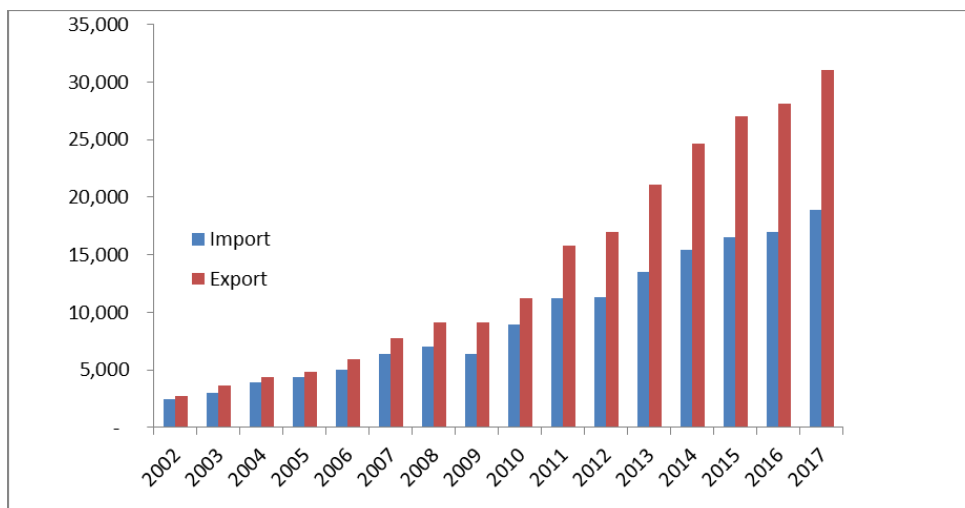
**Figure 4: Contribution of FDI to Vietnam total export (garment, fabric, fibre and yarn) from 2013-2017**

Items	2013	2014	2015	2016	2017
<b>Value of Vietnam's Export garment and fabric</b>	17,947	20,949	22,836	23,841	26,038
contribution of FDI (in value, Mil. USD)	10,689	12,422	13,768	14,418	15,791
contribution of FDI (percentage)	<b>59.60%</b>	<b>59.30%</b>	<b>60.30%</b>	<b>60.50%</b>	<b>60.65%</b>
<b>Value of Vietnam's export of fiber and yarn</b>	2,149	2,543	2,540	2,930	3,593
contribution of FDI (in value, Mil USD)	1,384	1,756	1,830	2,146	2,591
contribution of FDI (percentage)	<b>64.40%</b>	<b>69.10%</b>	<b>72.00%</b>	<b>73.20%</b>	<b>72.11%</b>
<b>Contribution of FDI to Vietnam total export (garment, fabric, fiber and yarn)</b>	<b>60.08%</b>	<b>60.35%</b>	<b>61.47%</b>	<b>61.87%</b>	<b>62.04%</b>

Source: Vietnam Customs

The industry enjoys a steady export growth rate and impressive export turnover. Figure 5 below presents the value of Vietnam’s textile and garment export and import from 2002 to 2017, which confirms the positive net export growth over the years.

**Figure 5: Vietnam’s Textile and Garment Export/ Import (2002 – 2017)**  
(million, USD)



Source: General Department of Customs 2017

## The supply chain structure of Vietnam’s textile and garment sector

Intermediaries from Japan, Taiwan, and China; global buyers; and local and foreign manufacturers form the supply chain. Domestic intermediaries mostly serve as the link between local manufacturers, global agents/brokers, and buyers in exchange for a commission.

The supply chain structure in Vietnam (Figure 6) is somewhat unique compared to the supply chain in China. Majority of the players in the textile sector are small and medium-sized enterprises (SMEs) that mainly do cutting and sewing, while a minority are large factories that produce the full range of textiles and garments.

Many manufacturers act as subcontractors to buyers and consolidators. Subcontracting arrangements are also common among privately owned factories with limited capacity and low value addition.

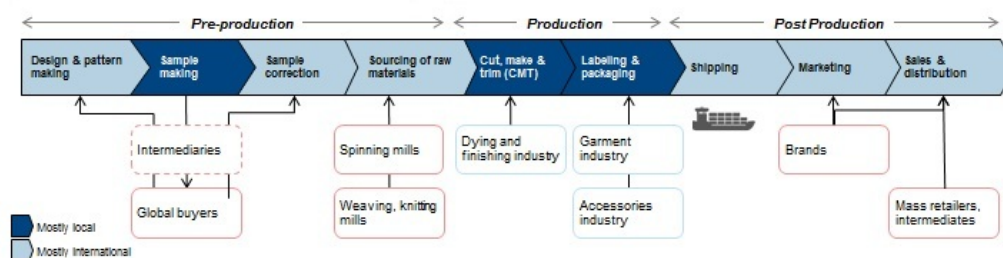
In most cases, buyers and consolidators provide cut make and trim (CMT) input material to manufacturers who as a result, have limited control on the input and on domestic and international supply chains.

By relying on buyers and consolidators for input material and specifications, garment manufacturers in Vietnam face challenges when trying to develop in-house design and engineering capabilities. Such advances would allow them to overcome the role of a subcontractor, and begin developing their own products and brands.

However, several emerging companies with original design manufacturing (ODM) and original brand manufacturer (OBM) are also trying to expand to the global markets. Expansion upstream and midstream will be the key to further development in the Vietnamese textile and garment industry.

Development of downstream will also be helpful to understand the market needs, which could result in the increase of cost, insurance and freight (CIF). Currently free on board (FOB) is dominant, causing little price control.

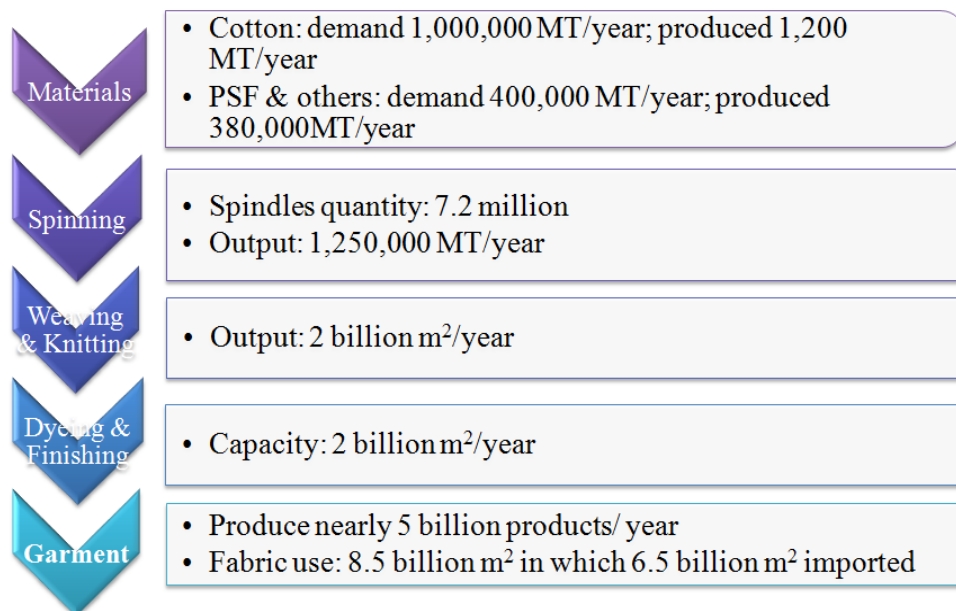
**Figure 6. Where is Vietnam in the TG Global Value Chain**



Source: ATC, JETRO

Due to the lack of raw materials and adequate production facilities (textile), Vietnam’s textile and garment sector largely depends on imported materials. Figures 7 & 8 illustrate the reliance on imports.

**Figure 7. Manufacturing capacity of Vietnam’s Textile and Garment Industry**



Source: GSO, VITAS (2016)

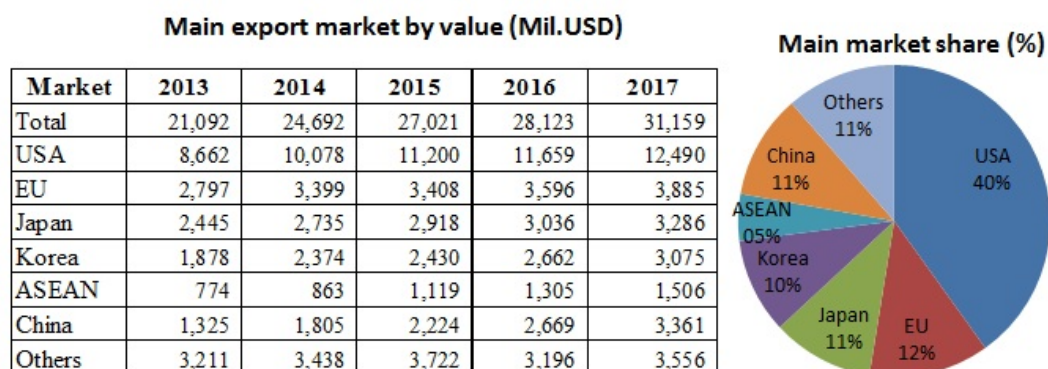
**Figure 8: Classification of Vietnam's Export - Import Textile and Clothing from 2013 to the first 6 months of 2018**

No.	Category	2013	2014	2015	2016	2017	6M/2018
	<i>Export Clothing</i>	17,237	20,149	21,838	22,762	24,715	12,855
	<i>Export Fabric</i>	710	800	998	1,079	1,323	787
	<i>Export Fibre &amp; Yarn</i>	2,149	2,543	2,540	2,930	3,593	1,992
	<i>Export Geotextile fabric</i>	400	456	435	415	457	265
	<i>Export Accessories</i>	596	744	1,210	937	1,071	597
<b>1</b>	<b>Total Export</b>	<b>21,092</b>	<b>24,692</b>	<b>27,021</b>	<b>28,123</b>	<b>31,159</b>	<b>16,496</b>
<b>2</b>	<b>Total Import</b>	<b>13,547</b>	<b>15,461</b>	<b>16,528</b>	<b>16,970</b>	<b>18,976</b>	<b>10,777</b>
	<i>Import Cotton</i>	1,171	1,443	1,623	1,663	2,356	1,548
	<i>Import Fibre &amp; Yarn</i>	1,520	1,559	1,515	1,608	1,814	1,154
	<i>Import Fabric</i>	8,397	9,428	10,197	10,482	11,366	6,271
	<i>Import Accessories</i>	2,459	3,031	3,193	3,217	3,440	1,804
<b>3</b>	<b>Import to Export</b>	<b>10,547</b>	<b>12,239</b>	<b>13,184</b>	<b>13,646</b>	<b>15,544</b>	<b>8,890</b>
<b>4</b>	<b>Balance Ex - Im (1-3)</b>	<b>10,545</b>	<b>12,453</b>	<b>13,827</b>	<b>14,477</b>	<b>15,615</b>	<b>7,606</b>
<b>5</b>	<b>Value added Rate (4/1)</b>	<b>50.0%</b>	<b>50.4%</b>	<b>51.2%</b>	<b>51.5%</b>	<b>50.1%</b>	<b>46.1%</b>

Source: GSO, VITAS (2018)

The country's major export markets in 2017 included the US (40%), the EU (12%), Japan (11%), and Korea (10%) (Figure 9).

**Figure 9. Vietnam Major Export Markets by value and percentage**



Given the context, there are a number of factors that underpin the strong growth of Vietnam's textile and garment sector:

- Low labour wages and low energy costs are among the top competitive advantages of Vietnam's textile sector. Vietnam's labour wages have long been considered competitive in the region, however, the recent frequent increases in basic wages and mandatory contribution to social and health insurance have gradually made Vietnam's labour resources less attractive to investors.
- Meanwhile, energy costs in Vietnam remains competitive due to the partial subsidisation by the Vietnamese government. Its current price structure does not allow the fully State-owned Vietnam Electricity to cover its production and



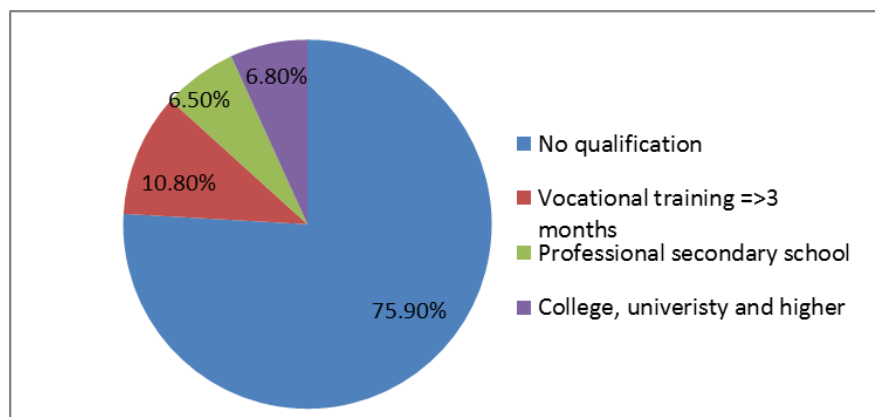
distribution costs. Since the end of 2011, the Vietnamese government has raised the price several times. According to the government's plan, the ceiling power price will reach 8-9 cents/kWh by 2020, which will remain to be competitive in the region.

- The government strongly intends to continue its support of the textile and garment sector, this is illustrated by its continued effort to enter into free trade agreements (e.g. EU FTA and CTPP), which will mostly benefit the textile and garment sector. FTAs also play an important role helping Vietnam move up the value chain in a number of sectors by supporting high-skilled jobs and knowledge transfer.
- Compared to the average infrastructure quality among the five Asian textile and garment exporting countries- as assessed by the World Economic Forum- the infrastructure quality of Vietnam is better than Cambodia and Bangladesh (WEF, 2016).

Despite its strength, the industry still faces some challenges that hamper its long-term growth, such as:

- Productivity of workers in textile and other industries has recently been a large concern of the country. Its vital comparative advantage of competitive labour cost cannot guarantee investors' and buyers' continued interest if the productivity does not improve and become more competitive than that of other countries. Vietnam's textile and garment labour force is of relatively low capacity. This suits current conditions, but cannot meet future demands. Currently, around 40% of FDI firms in Vietnam find it difficult to recruit skilled employees.

**Figure 10: Vietnam's Textile & Garment Labour Quality (%)**



- Dependency on imported materials and a poor supporting industry are the major setbacks of the textile and garment sector, particularly when free trade agreements with different countries come into effect. The major supplier of sector inputs is China, which is also a garment exporting country. The

Vietnam's high dependency on imports of raw materials - essentially China - makes the sector somewhat vulnerable.

- Limited efforts towards sustainable and green production. While brands are big promoters of safe and sustainable production in textile production, the Vietnamese Government and factories are somewhat behind. At the policy level, the Government of Vietnam has committed to reducing 8% of its 2005 level greenhouse gas emissions by 2030 at the United Nations Climate Change Conference held in Paris during November 2015 (COP 21). Relevant policy actions were issued, but limited efforts are seen at the factory and enterprise levels. If and when garment consumers favour products being produced exclusively at green facilities, Vietnamese factories will face with the threat of buyers' reallocation to countries where green production is more accomplishable.

## 2.2 Revising the Strategic Plan for Vietnam's Textile and Garment Industry

On April 11<sup>th</sup> 2014, the Ministry of Industry and Trade issued Decision No. 3218 / QD-BCT approving the Master Plan on the development of Vietnam's textile and garment industry up to year 2020 and a vision to year 2030.

According to this Master Plan, by the year 2020, the export turnover of Vietnam's textile and garment industry will reach US\$ 20 billion. However, in fact, by the year 2015, export turnover had already reached US\$27 billion and it is expected to reach US\$ 35 billion by the year of 2018.

To help Vietnamese enterprises take advantage of the challenges and opportunities of free trade agreements, Vietnam Textile and Apparel Association (VITAS) suggested that the Vietnamese Government adjust the Master Plan which was approved by the Prime Minister to keep up with the pace of deep integration as well as Vietnam's long-term vision, because many of the targets in this Master Plan were out of dated.

Based on the government's plans and objectives, there are some concerns to be considered:

- The intended expansion of textile and garment factories needs to be facilitated by the government through better policies and investment in the infrastructure. From 2018, a 6.5% increase of the minimum wage rate will be imposed and 26% of the basic wage and other payments will be social insurance allowances.<sup>3</sup> The new change partnered with upcoming labour related

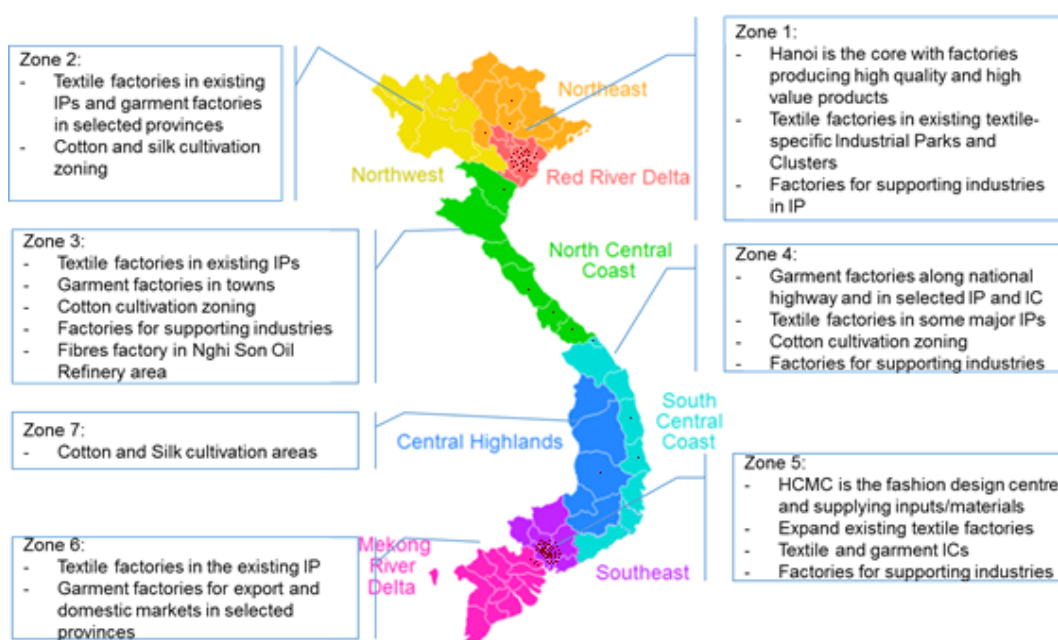
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<sup>3</sup> Under the provisions of the Social Insurance Law, at present, social insurance premiums are calculated on the basis of salary and allowances stated in the labour contract. However, from 1st January 2018 social insurance premiums were calculated on salaries and social insurance allowances and additional amounts stated in the labour contract. Accordingly, employees must pay 8%, employers (enterprises) must pay 18% and then, a total of 26% will be paid into to the social insurance fund.

requirements such as basic wage and social insurance payment increases, limited overtime-working hours, and unemployment support will make sector factories less competitive compared to other countries.

- Better enforcement of environmental, social, and safety standards will differentiate the sector from that of other garment-exporting countries. As consumers and brands develop better awareness and want to purchase green products, the greener production trend will help the textile and garment sector upgrade to higher value products. The adoption of eco-labelling, green technology, and green products in the textile sector have been emphasised in the National Green Growth Strategy. Implementation of the plan and development of support mechanisms for the manufacturers and producers remains unclear.
- The sector expects higher contribution from the textile segment (fabric) of the value chain. This will be of vital importance when Vietnam joins CPTPP, which will help Vietnam reduce importing raw materials from its biggest supplier, China. To fill the gap in the current textile value chain, it is necessary to start considering the diversification of import sources while the domestic production capacity is in development.
- VITAS also asked the Vietnamese Government, the Ministry of Industry and Trade, and the Ministry of Planning and Investment to group textile and garment enterprises in concentrated industrial zones. The concentration would facilitate the treatment of wastewater from the enterprises. VITAS suggested the Government allow the establishment of textile and garment industrial zones with 500-1,000 ha to draw domestic and foreign capital.
- VITAS and Vietnam Cotton and Spinning Association (VCOSA) suggested that the government should remove cotton planning from zone 2, 3, 4 and 7 of the Strategic Development Zones (Figure 11) in the future because long-time investments in cotton planning have not had effective results.

**Figure 11: Textiles and Garment Strategic Development Zones<sup>4</sup>**



## 2.3 Water in the textile supply chain

There are numerous players involved in the Vietnamese textile supply chain; from yarn production to garment production. According to VITAS, 87% of the sector's factories are garment factories and the remaining ones produce fabric, long and short fibres, synthetic fibres, and process cotton. The production capacity of the sector during each step in the supply chain is summarised below.

VITAS data informed that 70% of companies are sewing companies, 6% are spinning companies, 17% are weaving/knitting companies, 4% are dyeing companies, and the remaining 3% are ancillary organization. 85% of garment/ sewing factories are dedicated to CMT and 15% of garment factories do FOB business for production including raw materials, transportation, design and specific requirements.

The precise environmental impact of textiles varies significantly depending on the type of fibre the garment is made from. The following figure shows that wet processing carries the most impactful environmental footprint in the textile sector. Wet processing at garment factories uses intensive freshwater abstraction for bleaching and washing, dyeing, and finishing processes. The method generates and discharges a large volume of wastewater, while using a substantial amount of

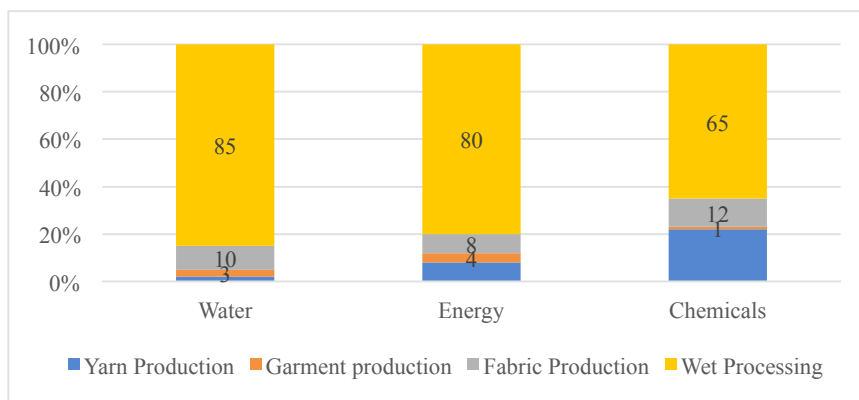
<sup>4</sup> Density of textile and garment companies: Northern Midlands 3%, Red River Delta 27%, North Central Coast and Central Coast 7%, Central Highlands 1%, Ho Chi Minh City and South East 58%, the Mekong Delta 4% (Vinatex, 2014)



chemicals. Wet processing also uses a considerable amount of high energy to heat water and generate steam.

There were no official figures confirming the number of wet processing units among the garment factories in Vietnam even though they impose the largest environmental and water footprint in the industry.

**Figure 12. Environmental Footprints of Textiles Value Chain**



*Source: Cotton Incorporated (2010)*

As there is no data on water usage in Vietnam’s textile and garment industry. It would be useful to look at the sector’s wastewater in comparison with that of another sector. According to data collected by Ministry of Industry in 2003 for the ADB-UNEP’s Report on Vietnam’s Environment Performance Assessment, textile was not the sector producing the most wastewater. In 2003, the sector ranked seventh of the eight industries, accounting for only 3% of the total wastewater discharge volume.

However, the textile and garment sector’s investment for treating wastewater only accounted for 1% of the total investment made by the eight industries. The estimated treatment cost might not be an exact proxy for determining the level of pollution caused by each industry; as a result, the data offers two different viewpoints.

First, the textile and garment industry does not provide adequate investment for treatment its wastewater due to its low level of pollution. Second, the textile industry provides less than half of the average treatment cost for its wastewater, which is inadequate; this might be due to the factories in the industry having limited understanding or awareness. In any case, the difference in pollution cost efforts across the sectors might result from the targeted treatment required for each industry.

**Figure 13. Industrial Waste Water Volume and Treatment Cost in 2003**

Industry	Estimated Treatment Cost (VND '000)	Estimated Treatment Cost (USD)	%	Volume of Waste Water (m3/year)	%	Avg Cost (VND/m <sup>3</sup> /year)	Avg Cost (USD/m <sup>3</sup> /year)
Chemical industry	51,900,000	2,306,667	16%	300,000,000	33%	173	0.008
Milk production	25,687,500	1,141,667	8%	250,000,000	28%	103	0.005
Pulp Production	77,214,500	3,431,756	23%	110,000,000	12%	702	0.031
Aquatic product processing	70,380,000	3,128,000	21%	92,000,000	10%	765	0.034
Leather production	73,500,000	3,266,667	22%	70,000,000	8%	1,050	0.047
Sugar production	5,430,000	241,333	2%	30,000,000	3%	181	0.008
Textile	4,250,000	188,889	1%	25,000,000	3%	170	0.008
Alcohol, wine and soft-drink production	20,425,000	907,778	6%	19,000,000	2%	1,075	0.048
<b>Total</b>	<b>328,787,000</b>	<b>14,612,756</b>	<b>100%</b>	<b>896,000,000</b>	<b>100%</b>	<b>367</b>	<b>0.016</b>

*Source: ADB-UNEP's Report on Vietnam Environment Performance Assessment*

In the textile industry water is heavily used for wet processing which produces enormous amount of waste water that needs to be treated before discharging it into rivers, lakes, sewers, or streams. For other processes in the supply chain, less amount of water is consumed at the factories, such as CMT. For small factories, such domestic usage might not require treatment before the wastewater can be discharged. Factories of a certain size must treat their wastewater as it is required by law. The Environmental Protection Law requires all larger non-dyeing weaving factories and washing and bleaching processes to conduct EIAs and to report the results of environment protection work to local authorities,<sup>5</sup> as well as treat their domestic

<sup>5</sup> Entities subject to environmental impact assessment (according to Decree No. 18/2015 / ND-CP dated 14/2/2015, Appendix 2): Project for of dyeing and dyeing facilities; All construction projects for weaving or dye- weaving establishments; construction projects for non-dyeing weaving establishments with capacity at least 10,000,000 m<sup>2</sup> of fabric per year; Construction projects for textile and garment manufacturing and processing plants with capacity at least 50,000 products per year for those involving the washing and bleaching process or at least 20,000 products per year for those not involving the washing and bleaching process; Construction projects for industrial washing and laundering with capacity at least 50,000 products per year; production projects for silk and synthetic fibres with capacity at least 1.000 metric tons of products per year. **All** projects for weaving or dye- weaving establishments, projects for textile and garment manufacturing and processing plants; projects involving the washing and bleaching process; projects for industrial washing and laundering; projects for silk and synthetic fibres are required to report results of environment protection works

wastewater<sup>6</sup>. Wastewater discharge from the textile and garment industry must comply with the receiving water as stated in the national technical regulations and standards (QCVN 13-MT: 2015/BTNMT, and TCVN 5945 - 2010)<sup>7</sup>. With the diversity of processes and products related to the textile industry supply chain; the country has increased its pollution control measures to address the water pollution issue; including more stringent regulations and effluent discharge standards. However, the sector's factories still experience difficulties in meeting those regulations and standards because of the limited understanding of the prevailing regulations and the cost associated with investing and maintaining ETPs. The failure in complying with the country's mandatory requirements for the sector will exacerbate water pollution in Vietnam and particularly within the textile and garment sector.

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<sup>6</sup> Law on Water Resources Decree No. 80/2014/ND-CP on the waste water drainage and treatment, and Decree No. 38/2015/ND-CP on the management of wastes and scraps applied to water drainage and wastewater treatment activities industrial parks must reach the technical standards applied to wastewater discharged into drainage system

<sup>7</sup> QCVN 13-MT: 2015/BTNMT - National Technical Regulations on the Effluent of Textile Industry (Viet Nam, 2015) applies to textile industry wastewater being discharged to receiving water; TCVN 5945 - 2010 - Industrial Waste Water Discharge Standards (Socialist Republic of Viet Nam, Ministry of Science, Technology and Environment, 2010) applies to the quality of industrial wastewater before being discharged to a water body

# 3. Water resources and management in Vietnam

## Summary of water resource and management

- The seasonal distribution of water resources is variable during the year owing to the unevenly distributed monsoon, which results in floods occurring in the wet season and extremely low flows in the dry season.
- Vietnam's climate and hydrologic characteristics vary spatially across the length of Vietnam with a sub-tropical climate in the north characterized by spring, summer, autumn, and winter seasons, and a tropical climate in the south characterised by just two seasons (wet and dry).
- Water pollution in rivers downstream from urban and industrialised areas seriously affects water quality. There is also evidence of local groundwater pollution – from poorly maintained septic tanks, garbage dumping, industrial effluents, and overexploitation.
- Monitoring shows that water quality problems are generally worst during the dry season, when river flows are reduced.
- In the Red River and Mekong River Deltas- particularly around Hanoi and Ho Chi Minh City- groundwater is exploited beyond its recharge capacity leading to drops in aquifer levels, increased saltwater intrusion in coastal and delta areas, as well as major land subsidence in the Mekong Delta area.
- More than 60 percent of surface water is generated in riparian areas outside of the country due to Vietnam being the farthest downstream nation of its two most significant rivers, the Mekong River and Red River systems.
- Vietnam's hydrology is especially vulnerable to the water management and development decisions (for example, existing and planned transboundary dams) of the upstream countries through which these rivers flow.
- Vietnam's water governance framework may generally be described as subject to ongoing development and refinement with regulatory responsibility shared across numerous government agencies.
- The effectiveness of the country's regulatory regime is undermined by its complexity and the fragmentation of implementation responsibility across multiple ministries and levels of government, which is exacerbated by the practical limitations on government resources to provide strong and consistent enforcement throughout the country.

## 3.1 Climate and hydrology

The land area of Vietnam is 331,690 km<sup>2</sup> and shares land borders with Laos (2,130 km), China (1,281 km), and Cambodia (1,228 km). Vietnam's coastline (excluding islands) spans some 3,444 km.

Towards the north, Vietnam is generally characterized by a subtropical climate with four separate seasons – spring, summer, autumn and winter. In contrast southern Vietnam is subject to a tropical climate with only two seasons – dry and wet. The wet season typically lasts from April/May to October/November with the driest periods occurring from December to February or from January to March depending on the specific location. Central Vietnam is often affected by hurricanes, storms, and very large waves from the Eastern Sea (UNFAO, 2012).

Although average annual precipitation for the country is around 1,820 mm, it varies considerably across the country ranging from 650 mm per annum in Phan Rang in the South-Central region, to 4,760 mm in Bac Quang in the North East region, and a potential maximum of approximately 8,000 mm per annum at Mach Ma national park. The midlands and plains typically experience an average of 1,600 to 2,200 mm, and the foothills in mountainous areas experience between 2,000 to 3,000 mm.

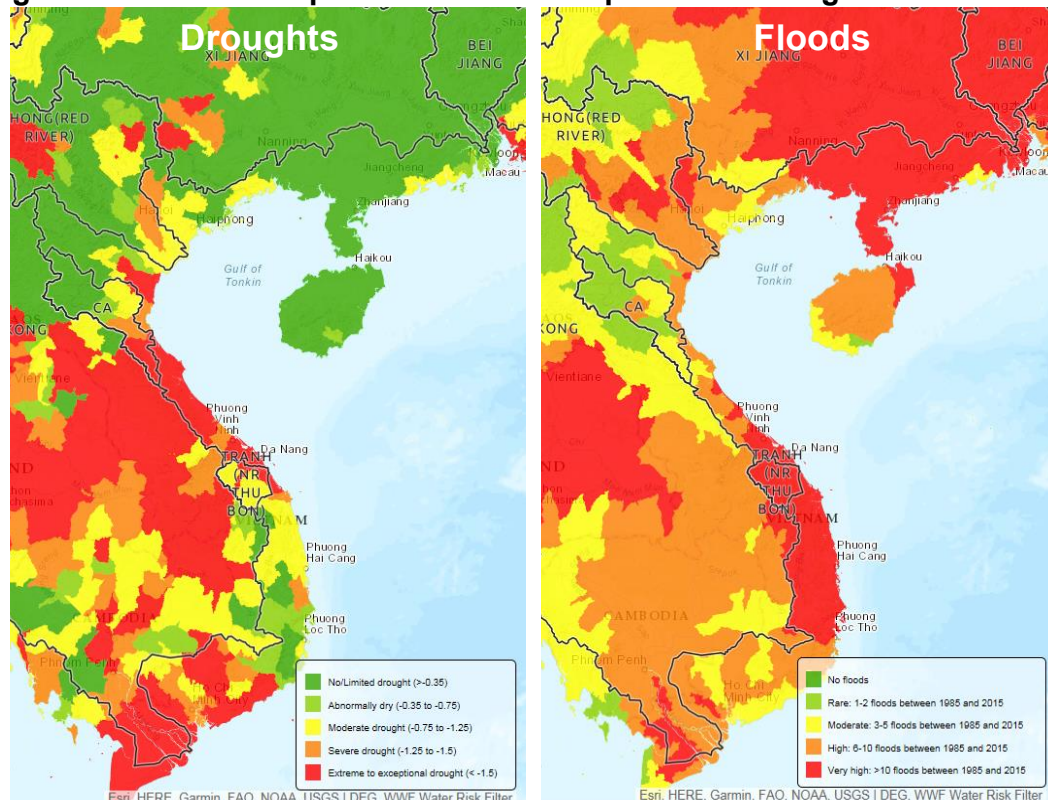
The seasonal distribution of water resources is highly variable during the year owing to the unevenly distributed monsoon rainfall, which results in devastating floods occurring in the wet season, and extremely low flows in the dry season. The total average annual surface water discharge is approximately 835 billion m<sup>3</sup> per year with about 70%-75% of the annual runoff generated in just three to four months (UNFAO, 2012).

Vietnam's climate and hydrologic characteristics vary spatially, across the length of the county (as shown in Figure 14):

1. North-eastern, north-western, and Red River Delta regions – characterised by a temperate climate with four distinct seasons with flash floods occurring in the upper reaches in the wet season and drought conditions in the dry season;
2. North-central coast region – characterised by high-intensity rainfall events and short flash flooding river systems with most rain occurring in October and November (with rain events of 500mm per day not uncommon) and with prolonged dry season drought conditions and low river flows towards the south;
3. South-central coast region – also characterised by short-run river basins which are subject to flash floods and prone to severe dry season drought conditions and low river flows throughout the entire region;
4. Central highlands region – characterised by a very prolonged dry season with severe droughts from January to May, followed by heavy rainfalls causing flash flooding, and with river flows occurring in both the eastward and westward directions (with most water flowing into the Mekong River in Cambodia);

5. South-eastern region (also referred to as the region north-east of Mekong) – characterised by rivers fed by tropical rainfall conditions in the wet season and dry season droughts; and
6. South-western or Mekong Delta region – characterised by being the most downstream reach of the international Mekong River system, with flooding as a normal and necessary phenomenon in the delta although very large flood flows in the wet season can join with the rivers in the south-east region to become a single combined flooded river system.

**Figure 14. Vietnam's spatial variation in exposure to droughts and floods**



Source: WWF Water Risk Filter: occurrence of 3-year droughts and of floods

## 3.2 Water quality

Although the upstream water quality of most rivers appears relatively good, downstream pollution mainly from urban areas and industries is seriously affecting water quality, especially near industrial outlets. Primary pollution indicators show that water quality problems are generally worse during the dry season, when the flows in the rivers are reduced (WEPA, 2017).

**Water quality issues vary across the regions of Vietnam:**

- North-eastern, north-western, and Red River Delta regions – characterised by general urban pollution, saline intrusion, and marine transport pollution risks in the north-east region and a hotspot of urban and industrial pollution, saline



intrusion, agrochemical pollution, and transport pollution risks in the Red River Delta area;

- North-central and south-central coast regions – both are characterised by local urban pollution and estuarine and coastal saline intrusion;
- South-eastern region – characterised by high levels of pollution from intensive urban and industrial development as well as coastal saline intrusion; and
- Mekong Delta region – characterised by coastal saline intrusion, low pH in rivers (exacerbated by the presence of acid soils), agrochemical pollution, and transport pollution risks.

### 3.3 Groundwater

Although the groundwater resources in Vietnam are abundant – with the total potential exploitable reserves of the country's aquifers estimated at nearly 60 billion m<sup>3</sup> per year – less than 5% of the total reserves are exploited across the country as a whole. Over 50% of these resources are in the central regions, about 40% in the north and 10% in the south<sup>8</sup>.

Despite the relative abundance in the north of the country, there is less groundwater exploitation in the Northeast because the reserves are scattered and diverse. In the Central Highlands, however, groundwater is exploited heavily for irrigation of cash crops resulting in shortages of water in parts of the region.

In the Red River and Mekong River Deltas, groundwater is exploited beyond the recharge capacity particularly around Hanoi and Ho Chi Minh City and especially in the Mekong River Delta (UNESCO, 2015). For example, the rates of groundwater level decrease at the centre points of the cones of depression typically range between 1.25m to 1.98 m per annum, and are up to 2.8m per annum in some aquifers. The corresponding decreases in total groundwater level range from 12.5m to 19.8m and are up to 25.8m in some areas (Lehner & Ouellet Dallaire, 2015).

Salinity intrusion is a significant issue in the Red River Delta, the Central Coastal Regions, and the Mekong River Delta. Although salinity intrusion is a natural phenomenon in coastal areas, increased groundwater exploitation is resulting in increased salinity intrusion and posing a threat to safe water supply, particularly in the Red River and Mekong River Deltas (UNESCO, 2015). In addition, land subsidence is being caused in the Mekong Delta areas by a reduction in sediment replenishment due to hydropower and sand mining in upstream transboundary river reaches and catchments (Mekong River Commission-GIZ Cooperation Programme,

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<sup>8</sup> A hydrogeological map of the whole country (on a scale of 1:500,000) has been completed with more detailed mapping being completed for aquifers within some sub-regions with a particular focus on urban geology. However, researchers report an urgent need to improve the national monitoring network of groundwater resources by increasing the density of monitoring wells, enabling the automatic collection of data and securing a commitment to operate groundwater monitoring stations over the long term (24).

2013). There is also evidence of local groundwater pollution from poorly maintained septic tanks, garbage dumping, industrial effluents, and overexploitation.

### 3.4 Transboundary river basins

Vietnam has a dense network of 2,360 rivers, most with small catchment areas. Eight river basins have a catchment area larger than 10,000 km<sup>2</sup>. The sizes of the eight largest river systems are listed in Figure 15 with the largest basins being the Mekong River and the Red River/Thai Binh, which together cover 45% of the country (UNFAO, 2012).

**Figure 15. Size of the eight large river basins in Vietnam**

River basin	Total area of basin (km <sup>2</sup> )	Area of basin within Vietnam (km <sup>2</sup> )	% of basin in Vietnam	% of Vietnam in basin
Ky Cung-Bac Giang	11,220	10,547	94	3
Red River-Thai Binh	155,000	85,250	55	26
Ma-Chu	28,400	17,608	62	5
Ca	27,200	17,680	65	5
Thu Bon	10,350	10,350	100	3
Ba	13,900	13,900	100	4
Dong Nai	44,100	37,485	85	12
MeKong	795,000	63,600	8	19
<b>Total</b>	<b>1,085,170</b>	<b>256,420</b>	-	<b>77</b>

The locations of Vietnam's river systems are shown in Figure 13. The Mekong River Basin is clearly the dominant geo-hydrological structure on the Southeast Asian mainland. People living within this region have adapted their production techniques and their way of life to the natural variability in the flow regime of the Mekong and its tributaries (Hoang & Nguyen, 2008).

Figure 16. River basins of Vietnam

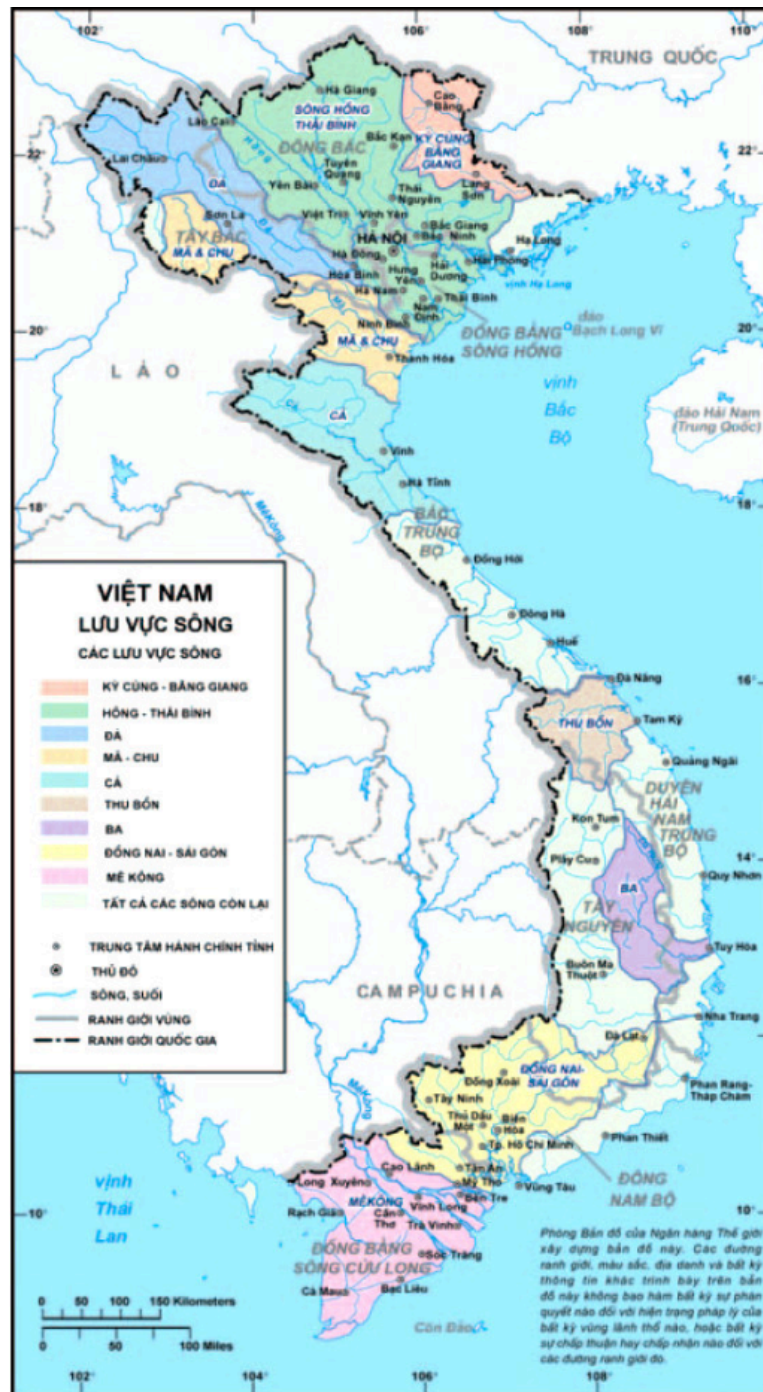
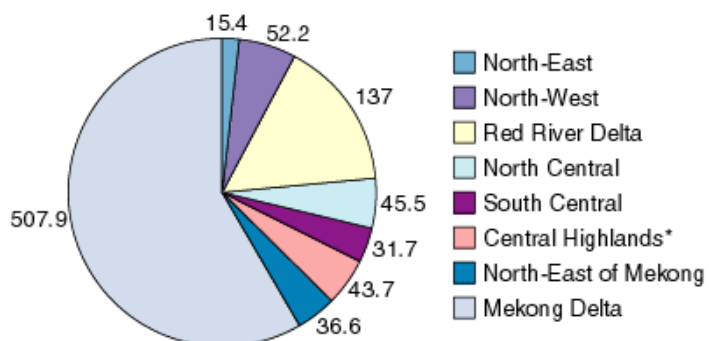


Figure 16 illustrates the regional distribution of runoff within the major rivers of Vietnam.

**Figure 17. Surface water run-off per region within Vietnam**



Source: National Water Sector Profile, 2002

More than 60% of surface water is generated in riparian countries outside of Vietnam; only 309 billion m<sup>3</sup> per year originates from major rivers within Vietnam (as shown in Figure 18).

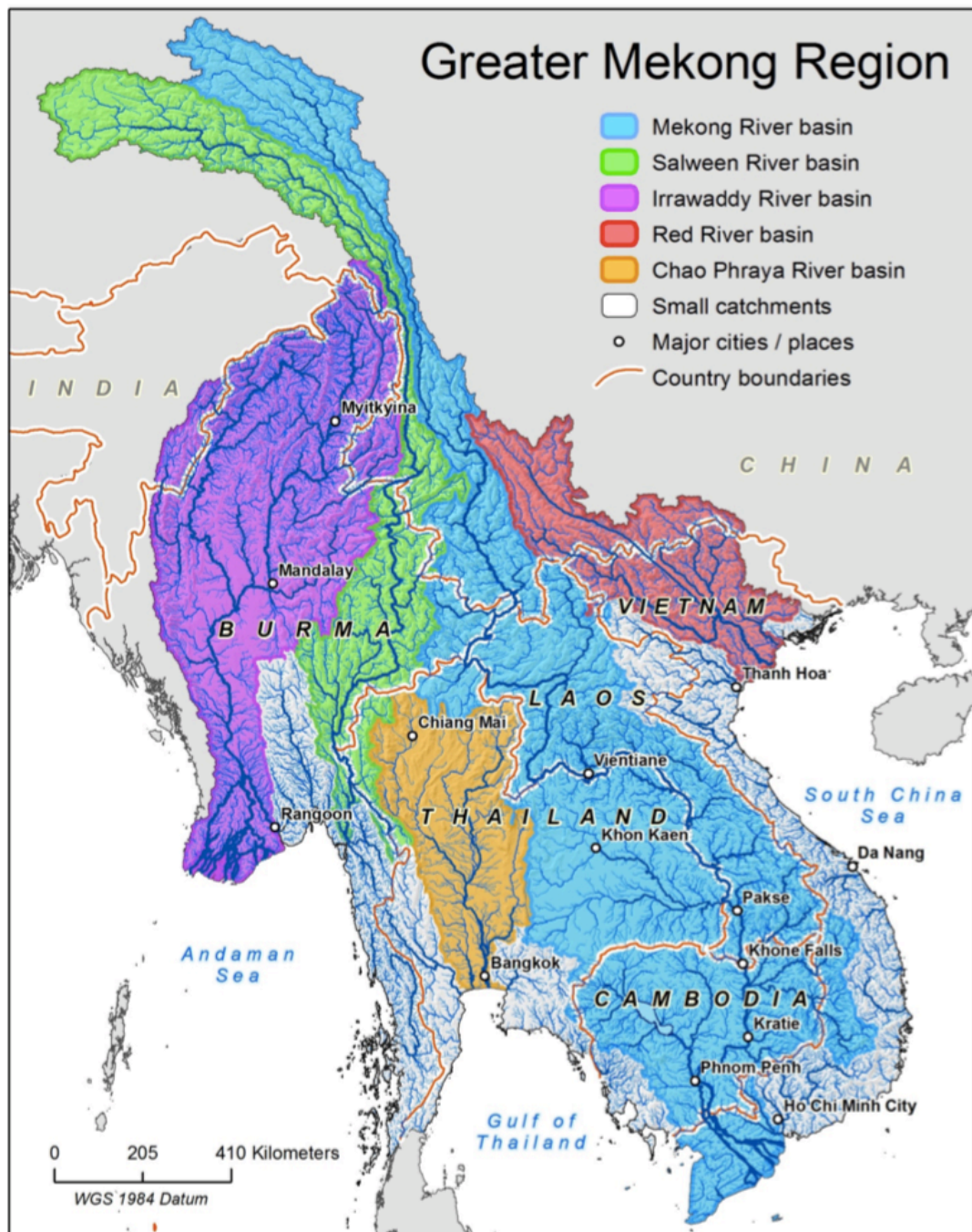
**Figure 18. Water resources in major rivers in Vietnam**

River Basin	Catchment area		Total Volume		
	Total Area in Vietnam (km <sup>2</sup> )	% in Vietnam	Total (billion m <sup>3</sup> )	Total generated in Vietnam (billion m <sup>3</sup> )	% generated in Vietnam
<b>Ky Cung-Bac Giang</b>	11,220	94	8.9	7.3	82
<b>Red River-Thai Binh</b>	155,000	55	137	80.3	59
<b>Ma-Chu</b>	28,400	62	20.2	16.5	82
<b>Ca</b>	27,200	65	27.5	24.5	89
<b>Thu Bon</b>	10,350	100	17.9	17.9	100
<b>Ba</b>	13,900	100	13.8	13.8	100
<b>Dong Nai</b>	44,100	85	36.6	32.6	89
<b>Mekong</b>	795,000	8	508	55.0	11
<b>Total</b>	<b>1,085,170</b>	<b>376</b>	<b>769.9</b>	<b>247.9</b>	<b>32</b>

Source: WEPA, 2017: data from Program KC-12

Vietnam is the farthest downstream nation of the country's two most significant river systems, including the Mekong River (which is the longest river in Southeast Asia) and the Red River (which is the largest river basin in Vietnam) (UNFAO, 2012) as shown in Figure 19.

**Figure 19. Transboundary locations of the Mekong and Red River systems**



*Source: Mekong River Commission – GIZ Cooperation Programme, 2013*

Vietnam's hydrology is especially vulnerable to the water management and development decisions (for example, existing and planned transboundary dams) of the upstream countries through which these rivers flow (WEPA, 2017) (shown in Figure 20).



In particular, as new dams are developed in the Greater Mekong Region, pressure on freshwater resources is growing which, although providing benefits for society, also typically poses threats to the river system's diversity and productivity through flow regulation and fragmentation of the river network (Mekong River Commission – GIZ Cooperation Programme, 2013). It diminishes the natural connectivity – longitudinal, lateral and vertical – of river systems, which adversely impacts species migration and dispersal as well as community structure and biodiversity patterns in river channels (Nguyen, 2012).

Suboptimal water development and management decisions in transboundary river basins results in a loss of river flows, sediment loads, land impacted fisheries, agricultural production, livelihoods, and food security in Vietnam. The decisions also cause social-economic regional impacts.

**Figure 20. Current and planned transboundary dams in the Mekong River Basin**



Source: CGIAR, 2017

The riparian states<sup>9</sup> of the Mekong River Basin differ significantly from each other in their geographical size, number of inhabitants, type of economy, level of education

<sup>9</sup> Vietnam is a downstream riparian state for most of its transboundary rivers, of which the six major ones are: the Bang-Ky Cung and Red rivers, coming from China; the Ma and Ca, coming from Lao People's Democratic Republic; and the Dong Nai and Mekong, coming from Cambodia. Most of the rivers flow to



standard of living, political system, and their cultural traditions and social practices (Hoang & Nguyen, 2008). However, all countries intersected by the basin are striving for economic growth to counter poverty<sup>10</sup> and are utilising the river's water resources differently to achieve this. For example, China has targeted hydropower generation; Thailand and Vietnam are using water for irrigation and industry; Cambodia also heavily depends on irrigation, whilst Laos has relatively small irrigation and industry but a large hydropower expansion plan greater than its national needs (i.e. mainly for export) (Hoang & Nguyen, 2008).

## 3.5 Vietnam's water governance framework

Vietnam's water governance framework may generally be described as subject to ongoing development and refinement, although fragmented and inconsistent in application. There are numerous regulations that include provisions relevant to the management of water and wastewater in Vietnam. Two main laws underpin these:

- **The Law on Environmental Protection (LEP)** – first passed in 1993 and updated in 2005 and 2014 – the LEP has progressively been updated to encompass policies, measures, resources, and regulations. It sets out the rights and obligations for state agencies, organizations, households, individuals, overseas Vietnamese, foreign organizations, and individuals carrying out activities in Vietnam (Nguyen, 2014);
- **The Law on Water Resources (LWR)** – first passed in 1998 and last updated in 2012 – the LWR regulates the management, protection, development, and utilization of water resources<sup>11</sup>, as well as the control and mitigation of any adverse consequences caused by water (Nguyen, 2014). The LWR also created three river basin organisations for the Mekong, the Dong Nai and the Red-Thai Binh basins as a step towards implementing integrated water resource management (IWRM).

### Other laws relevant to environmental and water resource protection in Vietnam

include:

- **The Ordinance on Natural Resources Tax (amended) 1998** – this aims to protect, exploit, and use natural resources in an economic, rational, and effective manner; as well as protect the environment and ensure revenue sources for the state budget;
- **The Ordinance on Exploitation and Protection of Irrigation Works 2001** – this applies to irrigation works that have been built and already put into operation (e.g. dykes, flood and storm prevention works, hydroelectric works, urban water supply, and drainage works);

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the Gulf of Tonkin and the Eastern Sea. The Bang-Ky Cung flows to China, and the Srepok to the Mekong in Cambodia.

<sup>10</sup> This has seen most countries achieving moderate to high economic recent growth rates in GDP (e.g. ranging between 4% up to 10% per person employed in 2012-2013) (UN)

<sup>11</sup> Where water resources refers to surface water, rainwater, groundwater and seawater within Vietnam.

- **The Law on Land 2003/2013** – this prescribes the authorities, responsibilities, rights, and obligations for land ownership, management, and use to ensure the economical and efficient use of environmental resources, protect the environment, and achieve sustainable management and exploitation of natural resources management;
- **The Law on Fisheries 2003/2017** – this applies to the fishery activities of Vietnamese organizations and individuals, and foreign organizations and individuals;
- **The Law on Inland Waterway Navigation 2004/2017** – this regulates navigable inland waterways’ activities to ensure safety for infrastructure, vessels, and people; and
- **The Law on Dykes 2006** – this relates to the protection of dykes and the management of floods and storms’ impacts (Nguyen, 2014).

A plethora of secondary regulations have also been issued to further protect Vietnam’s water resources, sometimes with differing legal viewpoints or policy objectives. Examples include:

- Separate national strategies for environmental protection and for water resources by 2020;
- Specific regulations relating to river basin management and to fees for environment protection of wastewater;
- A suite of national technical regulations that set specific water quality requirements for groundwater, surface water, protection of aquatic life, irrigated agriculture, coastal waters, and off-shore waters (UN, 2014); and
- Mining regulations relating to the licensing of sand mining for construction purposes including a prohibition on its export.

A number of government agencies reported within interviews that presently there are amendments to water laws being considered, which are consistent with the government’s strategy for green development. For example, a new draft decree proposes replacing two existing decrees to provide for two new types of industrial zones (for an “urban area” or for a designated “eco-industrial zone” within which factories will be required to undertake cleaner production, review their efficiency of natural resource utilization and management, and to collaborate with others to produce a better product). In addition, the government has signalled that it proposes to ban all groundwater use in the southeastern region in response to the land subsidence threat posed by current over-exploitation of groundwater aquifers.

Regulatory responsibilities for water and wastewater planning, monitoring, and enforcement are shared among numerous government agencies as summarised in Figure 18. However, as discussed in Sections 4.2.1 and 4.2.2, the effectiveness of the regulatory regime outlined above is undermined by its complexity, the fragmentation of responsibility for implementation across multiple ministries and levels of government, and exacerbated by the practical limitations on government resources to provide strong and consistent enforcement throughout the country.

**Figure 21. Vietnam agencies with water and wastewater regulatory responsibilities**

Central government ministries	Mandate relating to water resource management	Associated provincial level departments
Ministry of Natural Resources and Environment (MONRE) including Vietnam Environment Administration (VEA) and Department of Water Resources Management (DWRM)	<ul style="list-style-type: none"> <li>• State management of water resources</li> <li>• General land use planning;</li> <li>• International coordination of water resources management in the Mekong River Basin;</li> <li>• Management of hydro meteorological, surface water, groundwater, and water quality data collection;</li> <li>• Water quality standards</li> </ul>	Departments of Natural Resources and Environment (DONREs) subject to decisions of provincial-level People's Committees
Ministry of Agriculture and Rural Development (MARD)	<ul style="list-style-type: none"> <li>• Irrigation;</li> <li>• Drainage;</li> <li>• Rural water supply;</li> <li>• Flood &amp; disaster prevention;</li> <li>• Cultivation land management;</li> <li>• Fishery;</li> <li>• Hydropower (in coordination with the Ministry of Industry &amp; Trade)</li> </ul>	Departments of Agriculture and Rural Development (DARD) subject to decisions of provincial-level People's Committees
Ministry of Construction (MOC)	<ul style="list-style-type: none"> <li>• Urban water supply and Drainage</li> <li>• Handling of urban wastewater</li> <li>• Sand mining</li> </ul>	Departments of Construction (DOC)
Ministry of Planning and Investment (MPI)	<ul style="list-style-type: none"> <li>• Allocation of planning and investment;</li> <li>• Coordination of international relations</li> </ul>	Departments of Planning and Investment (DOPI)
Ministry of Industry and Trade (MOIT)	<ul style="list-style-type: none"> <li>• Hydropower (in coordination with the MARD)</li> </ul>	Departments of Industry and Trade (DOIT)
Ministry of Health	<ul style="list-style-type: none"> <li>• Water standards &amp; regulations (drinking &amp; domestic water)</li> </ul>	
Ministry of Public Security	<ul style="list-style-type: none"> <li>• Preventing, combating and investigating violations against environmental protection (in coordination with MONRE)</li> <li>• 'environment police'</li> </ul>	

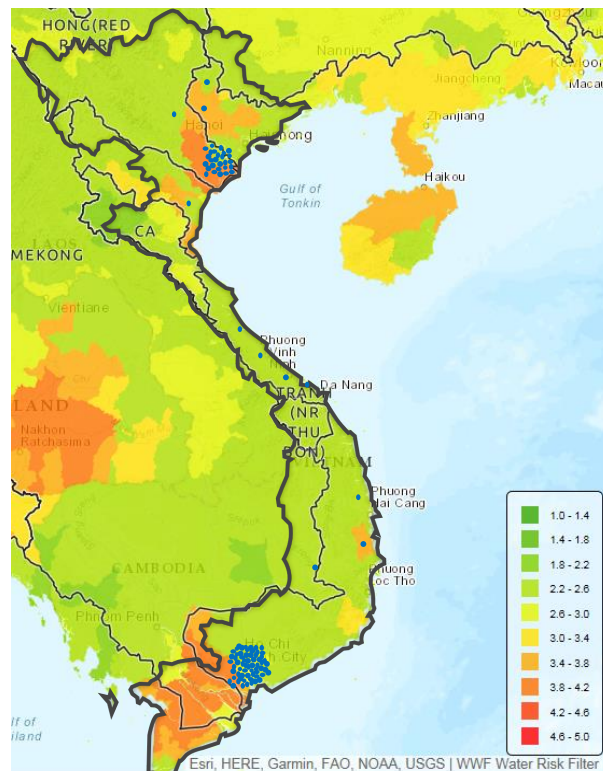
*Source: compiled by authors*

# 4. Water risks and Vietnam's textile sector

## Summary of Vietnam's Textile Sector Water Risks

- This section examines key areas of water-related risk affecting Vietnam's textile sector at the sub-national scale for each sub-category of physical, governance, and reputational risk as well as for transboundary water risk.
- Physical water-related risks for the textile sector vary across Vietnam with the highest threats relating to surface water shortages in the southern half of Vietnam; groundwater shortages throughout Vietnam's heavily industrialised zones; and areas under intensive agricultural development.
- The government has indicated their intention to ban groundwater use in the Mekong Delta area by 2025 to combat subsidence, salt-water intrusion and other issues.
- The level of risk for serious surface water quality deterioration correlates closely with the areas of existing industrialisation within Vietnam.
- Governance and regulatory water resource risks relate to the complexity and fragmentation of existing management and planning frameworks and their administration by overlapping agencies. This creates an uncertain and challenging business investment climate for planning and growing textile factories.
- Reputational risk to textile brands would arise if textile factories were found to be non-compliant with environmental approvals or licences. Weak or inconsistent enforcement by authorities might exacerbate this risk by creating conditions conducive to higher levels of environmental non-compliance by factories and industries.
- Significant risks to all sectors, including textile, arises from suboptimal water development and management decisions in transboundary river basins upstream from Vietnam which may cause loss of river flows, sediment loads, land, fisheries, agricultural production, livelihoods, and food security in Vietnam. In addition, reduction in dry season flows from transboundary river systems compounds the effects of over-extraction of groundwater, accelerating the processes that are causing the ground within delta areas to sink, land to be lost to the sea and estuaries, and water from delta rivers to aquifer systems.

**Figure 22. Overall water risk for the “clothing and apparel” industry as assessed by WWF’s water risk filter tool**



*Source: WEPA, 2017*

## 4.1 Physical risks

### 4.1.1 Surface water shortages

**Vietnam’s water risk** – this relates to shortages in surface water supplies occurring during dry season drought events.

Surface water resources within Vietnam are distributed unevenly across the country and non-uniformly throughout the year. This means that the risk of surface water shortages is naturally higher in some areas than others. Thus the threat of severe surface water shortages is especially heightened during dry season drought events. The risk being made more likely by:

- Increasing frequency of severe El Nino-induced drought events such as the event which occurred in early 2016 where 39 out of 63 provinces, the southern half of Vietnam, were seriously impacted and 14 provinces declared a state of emergency where there was insufficient water to even supply people’s daily consumption needs (MONRE, 2016);
- The effects of climate change including rising temperatures, increased numbers of hot days and reduced rainfall in the dry season- especially in the North Central Coast, South Central Coast and Southern Vietnam (Sayers, et al., 2016);
- Additional increases in upstream water developments and diversions leading to unsustainable levels of surface water extraction;
- Little political appetite or feasible potential for supply-side management in Vietnam’s heavily industrialised and populated areas, which is not an unusual situation in highly developed basins globally. This means that there may be increased pressure for the

government to encourage water savings through demand-side reforms such as pricing, measurement, water usage efficiency and recycling, and public education (Shah, Verma & Durga, 2014);

### What does this mean for Vietnam's Textile Sector?

Textile factories that rely on surface water as their main source may have their supplies restricted or interrupted during periods of prolonged and/or severe drought.

**Threats to the factories/brands** arising from this risk include:

- Factories may be forced to temporarily reduce the rate at which they take and use surface water supplies during severe droughts;
- Impact on their level of production if they do not have access to alternative water sources.

**Impacts from the factories/brands** that potentially exacerbate this risk include:

- Factories that currently take groundwater but switch to take surface water in the future will put additional pressure on surface water supplies during droughts.



### Level of risk for textile stakeholders in next 5 years:

- Possible for factories in parts of the north-central coast region and south central coast region.
- More likely for factories operating in the southeastern region (especially around the greater Ho Chi Minh City region and southeastern coastal regions) where a proposed ban on groundwater use- which will be discussed in the next section- could result in factories taking more surface water.

### What textile stakeholders said:

- No factories reported experiencing any water shortages despite the recent drought that affected the southern half of Vietnam.
- One factory said that they were committed to reducing their impact on the environment. They indicated that they were hoping to achieve minimal surface water usage in their washing by introducing new non-water-using, low-energy laser washing technology.
- The VITAS attributed unreliable water for cotton irrigation in Vietnam as a key factor that led to the demise of cotton production in the country and the need to source cotton from China, USA, Australia and India.

### Opportunities for mitigating the risk:

- 1) Wet-processing **factories** should reduce the volume of water that they take from surface water supplies by:

- a) Recycling and reusing their treated wastewater and cooling water within their wet production processes;
  - b) Eliminating water losses or waste within the factory by upgrading equipment or improving their wet production processes;
  - c) Reducing the volume of water used in the production process by investing in more water efficient and energy optimised washing, drying, ironing, and water heating technologies;
- 2) **IPs** should
- a) Collect and deliver high-quality recycled water to factories from centralised wastewater treatment systems rather than disposing it to rivers;
  - b) Draw on WWF’s experience in developing and implementing standards for eco-IPs in China for best-practice collective water saving and wastewater management actions
- 3) **NGOs should work in partnership with textile brands and industry associations** to take collective action to:
- a) Promote existing textile factories efficient water-use by establishing textile sector voluntary standards for:
    - Measuring (or estimating) and reporting the volume of its water/recycled wastewater inputs, water/wastewater outputs, water losses/leakage, and domestic/industrial water consumption;
    - Assessing, reporting, and benchmarking each factory’s water use efficiency in terms of its total water consumed (i.e. total volume of water inputs minus total wastewater outputs to the river) divided by total volume of water inputs.
  - b) Report and benchmark textile water use efficiency between factories to identify and target those factories warranting improvement;
  - c) For new or expanding textile factories, situate new heavy water processing textile plants in least-stressed river basins (utilizing the government drought-risk maps mentioned below);
  - d) Publish factsheets that identify ways that factories can improve their water-use efficiency, the benefits of investing in such improvements, the technology, and investment partners willing to assist in the transition.
  - e) Work with government and private water suppliers (including Industrial Parks) to create and regulate incentives for supporting the reduction in the volume of water taken by factories including, through projects like encouraging win-win scenarios such as the reuse of treated wastewater within the textile sector and with other adjacent industries;
  - f) Train factory staff in water efficiency and the importance of eliminating water waste.
- 4) The **government** should consider initiating a smart water-use program – that incentivises or encourages factories to transition to water efficient practices, technologies, recycling, and to meet or use less than their licenced withdrawal limits – targeting those areas that are likely to be impacted by severe drought and where there are significant surface water extractions by factories.
- 5) The **government** should consider adapting the drought-risk mapping and zonation of drought hazards and risks that has been the subject of significant research in China in recent years (by the Institute of Water Resources and Hydropower Planning and Design (GIWP)) to inform national policies around drought management (Shah, Verma & Durga, 2014).



## 4.1.2 Groundwater shortages

**Vietnam's water risk** – this risk relates to available supplies of acceptable quality groundwater being potentially inadequate to sustain the needs of agriculture, food production, urban populations, and industry.

Falling aquifer levels and deteriorating water quality directly impact groundwater availability for industrial use. This is caused by:

- Over-exploitation of groundwater reserves in highly industrialised regions of Vietnam where groundwater usage exceeds the sustainable yields of aquifers;
- The potential for future uncontrolled growth in the solar pumping of groundwater resources, particularly for irrigation purposes, (which is emerging as a major threat to aquifers in other countries such as India (Anthony et al., 2015);
- Significant lowering of water tables and resulting salt water intrusion in delta areas and in coastal aquifers around Ho Chi Minh City and Hanoi. Significant rates of land subsidence, deepening of river channels (and land loss) is also occurring in the Mekong Delta areas and around Ho Chi Minh City (IUCN, 2011);
- Contamination by naturally occurring arsenic within groundwater in the Red River Delta and, to a lesser extent, the Mekong Basin (which makes it unsuitable for consumption);
- Contamination by agricultural-related pollution that is associated with aquifers' absorption of sulphates and nitrates from the use of fertilizers;
- Entry of surface water pollutants or inferior quality groundwater into otherwise good quality aquifers via poorly constructed wells (Delta Alliance, 2011); and
- Conversion or drainage of wetlands for agricultural production and/or the interception of recharge waters (i.e. the construction of dykes or the creation of polders) (British Water, 2017).

## What does this mean for Vietnam's Textile Sector?

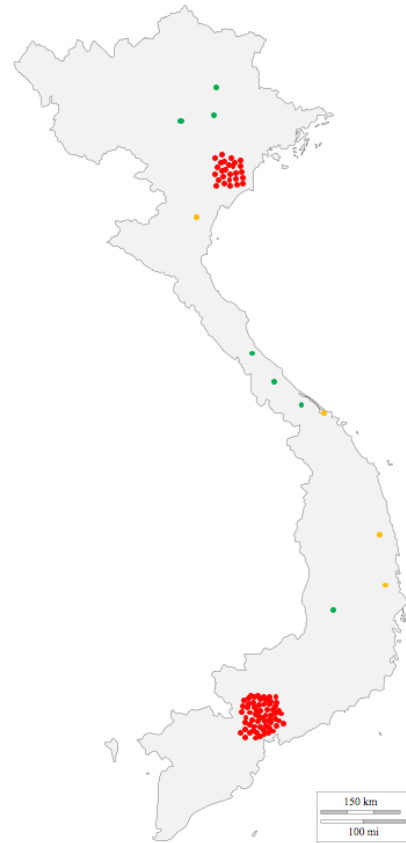
Textile factories that rely on groundwater as their main supply may be forced to switch to other sources of water.

**Threats to the factories/brands** arising from this risk include:

- Factories may be forced to secure water from other sources than groundwater (e.g. river water or town water) or to pump groundwater from deeper wells to access lower aquifer systems;
- Factories may incur additional capital and operating costs- and additional water charges- from having to switch to other water sources, pump water from deeper aquifers, or treat surface water for use in wet processing;
- Increased use of surface water sources by multiple factories and industries in an area may increase the risk of surface water shortages;
- The government may not be willing to approve licences to increase the volume of water that factories can take from groundwater;
- Short-term operational disruptions may occur when aquifer levels are inadequate and cannot fully supply a factory's water needs, impacting the operations of other actors in the supply chain.

**Impacts from the factories/brands** that could potentially exacerbate this risk include:

- Over-extraction of- or unsustainable levels of abstraction from- groundwater supplies by wet-processing factories may accelerate the drawdown of local aquifer levels and the deterioration in local groundwater quality.



## Level of risk for textile stakeholders in next 5 years:

- Almost certain for a small number of factories operating in the south-eastern and Mekong Delta regions where the government has signalled that use of groundwater for any purpose will be banned by 2025 in order to stop land subsidence;
- Possible for factories operating in the Red River Delta where government is concerned

## What textile stakeholders said:

- Factories indicated that “groundwater is cheap”, “easy for them to access”, and that they would not change to surface water unless forced to;
- The government stated that it was their intention to ban groundwater use in the Mekong Delta area by 2025
- One Industrial Park stated that although

<p>about current over-extraction but has not yet signalled a ban on groundwater use; and</p> <ul style="list-style-type: none"> <li>• Currently dormant but likely to increase in coastal and estuarine areas in the north-central coast region.</li> </ul>	<p>they were aware of the proposed changes, they did not believe a government ban on groundwater usage would be implemented any time soon (although this perception may change once the government starts to broadcast its intentions more widely)</p> <ul style="list-style-type: none"> <li>• Other factories were not aware of the risk and had not explored alternative source options.</li> </ul>
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### Opportunities for mitigating the risk:

- 1) **Government agencies** should:
  - a) Advocate for existing factories to stop groundwater use in over-exploited areas and enforce bans where established by regulations (including preventing the installation and use of solar-powered groundwater pumps);
  - b) For new or expanding textile factories, situate new heavy water processing textile plants in non-stressed river basins (utilizing the government drought-risk maps mentioned below) and condition approval on factories implementing efficient water-use processes and technologies;
  - c) Make the monitoring of groundwater levels, quality and contamination, and assessment of sustainable recharge rates a priority in areas being over-exploited or under threat from growth in groundwater usage
  - d) Communicate to the textile sector its plans (including affected locations and proposed transition timeframes) and rationale for restricting and/or banning access to groundwater sources, enabling factories to prepare for change.
- 2) **Factories** who are currently reliant on groundwater and would likely be forced to use surface water in the future make implementing the recommendations relevant to mitigating the risk of surface water shortages (through efficient water-use and recycling practices etc.) outlined above.

## 4.1.3 Surface water pollution

**Vietnam’s water risk** – this risk relates to on-going deterioration in surface water quality due to the pollution of Vietnam’s water supplies.

While the poor water quality of factory inputs may be mitigated by textile factories through increased water and wastewater treatment, surface water pollution has broader impacts in terms of the threat to peoples’ health (through their exposure to pollution and toxins), impacts on agricultural and aquaculture production, as well as on the environment. Serious surface water pollution in Vietnam is being caused by:

- Untreated and polluted industrial water (including water from IPs, export processing zones, and hospitals) entering river systems;
- Discharge of untreated domestic wastewater and sewage in urban areas (with only about 15% of wastewater reportedly being treated) (Sayers et al., 2013) and with high levels of polluted discharge near the Red River, Huong River and around Ho Chi Minh City (British Water, 2017);
- The rapid pace of urbanisation and the development of many industrial zones throughout the country which outstrips wastewater treatment capacity in both urban and industrial areas including industrial parks (although treatment capacity of 850,000 m<sup>3</sup> per day is expected to

increase by another 1,600,000 m<sup>3</sup> per day due to the more than 40 new wastewater treatment plants under construction and with nearly 78% of industrial zones having started to operate with dedicated wastewater treatment plants) (Sayers et al., 2013);

- The lack of effective regulatory controls to prevent or discourage the discharge of pollutants into river systems;
- Saltwater intrusion from the river mouth and in coastal areas arising from low surface water flows during the dry season, climate change, and over-extraction of surface and groundwater;
- Low pH in rivers exacerbated by the presence of acid soils and agrochemical pollution;
- Oil spills and leakage from marine transportation and shipwrecks in coastal areas (WEPA).

## What does this mean for Vietnam's textile sector?

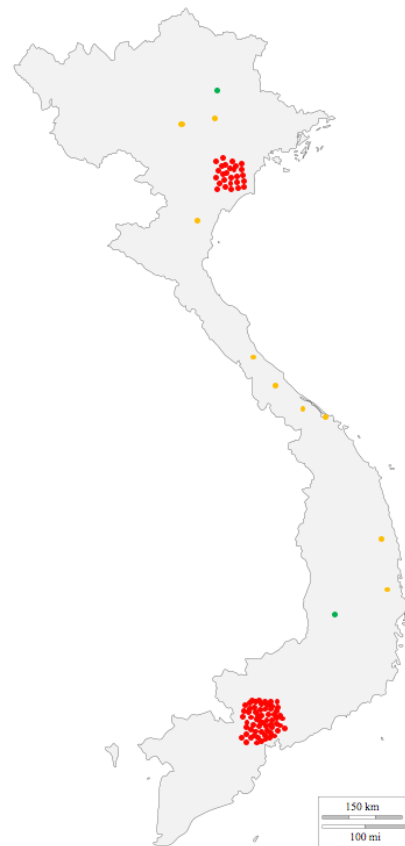
Poor surface water quality may impact local community health and lead to stricter controls being imposed on the operations of textile factories.

**Threats to the factories/brands** arising from this risk include:

- The health of local communities and workers may be impacted by toxicity within the riverine environment which disrupts the operation of factories;
- The government may impose conditions on the operation of textile factories in response to their pollution or in instances where they are not the cause of the pollution but a broad-based regulatory approach is taken;
- Incurring additional capital costs, operating costs (including input water quality treatment costs), or disruptions associated with the operation of factories.

**Impacts from the factories/brands** that could potentially exacerbate this risk include:

- Discharge of poor quality wastewater by factories into river systems which further contributes to poor surface or groundwater quality; impacting downstream agriculture and fisheries production.



## Level of risk for textile stakeholders in next 5 years:

- Possible for factories in heavily urbanised, industrialised, and polluted

## What textile stakeholders said:

- Although factories were aware that the community was concerned about poor water quality within Vietnam's river systems, the factories indicated that they felt they have

regions within Vietnam.	<p>taken adequate measures to (a) treat their wastewater to meet the discharge water quality requirements and (b) treat their water supplies to meet the production process water quality requirements;</p> <ul style="list-style-type: none"> <li>• Most government agencies (MONRE, MARD) expressed concerns about poor water quality in industrialised areas and its effects on human and environmental health. They did not distinguish between the textile industry and other industries, but indicated that smaller factories were more likely to pollute than larger ones.</li> <li>• MARD noted that throughout Vietnam, wastewater treatment capacity and skills were not keeping up with the rapid pace of infrastructure development.</li> <li>• MPI stated that the environmental performance of industrial zones was not being reported though it is a potential area for future attention.</li> </ul>
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### **Opportunities for mitigating the risk:**

- 1) **All stakeholders** should take collective action to:
  - a) Develop consistent water quality discharge standards and monitoring practices across the textile sector- with a priority focus on wet-processing plants.- that are based on “best in class” wastewater discharge limits (ZDHC mid or high level) and should be equal to or exceed government requirements;
  - b) Adopt textile sector water quality discharge standards as an industry standard that applies to all textile exports from Vietnam;
  - c) Provide factories with factsheets that identify ways to improve their wastewater management treatment processes or equipment to achieve these standards;
  - d) Share IP/site-level best practice approaches and standards being developed by WWF and its partners in China and other countries;
  - e) Develop and promote a system of certification, training, and monitoring that connects to existing global reporting platforms (including Sustainable Development Goal - SDG reporting) and that factories can use to demonstrate their achievement of these standards when negotiating orders with buyers and back-filling orders from other factories;
  - f) Establish a national platform that enables benchmarking of wastewater discharge and water quality between factories as well as against other polluting industries;
  - g) Prepare communications that identify and profile factories and brands which monitoring has shown to be exemplar performers against water and wastewater management standards
- 2) **Government, funding agencies, financiers, and investors with support from NGO** should:
  - a) Advocate for, and create, mechanisms and/or incentives to support factory and IP-level investments in water efficient, clean technologies and wet production processes including retrofitting at existing plants;
  - b) Develop portfolios of bankable projects;
  - c) Undertake a study that includes a stocktake of the environmental performance- in terms

of water-footprint- of industrial zones and IPs and identify opportunities for improving their future reporting and regulatory regime; and

d) Connect with global providers of clean water and wastewater technologies.

#### 4.1.4 Flood-induced damage

**Vietnam's water risk** – this risk relates to flooding and the associated major local or widespread loss of life or livelihoods, property damage, adverse impacts to utility services, and physical loss of access to communities and businesses.

**Flooding risk varies across Vietnam due to:**

- Topography of the country – upstream mountainous rivers are prone to flash flooding whereas downstream low-lying areas are vulnerable to widespread riverine inundation. In the large transboundary river systems, mainstream floods originate from upstream beyond Vietnam's borders and ultimately overflow to its extensive, poorly drained delta systems (Red River and Mekong River) (British Water, 2017; Hoang & Nguyen, 2008);
- The incidence and frequency of hurricanes and major storms that cross Vietnam's lengthy coastline in the wet season- and are particularly prevalent in Central and Southern Vietnam- combine with storm surges, spring tide conditions, and very large waves from the Eastern Sea (UNFAO, 2012) to produce sea level rises up to 5 or 6 metres as well as massive waves and flooding in low-lying coastal areas (Sayers et al., 2016). Water and sanitation infrastructure along the coastal zone is especially sensitive to sea level rise and flooding caused by typhoons (Delta Alliance, 2011);
- The extent of floodplain developments within delta areas (i.e. the expansion of agriculture/irrigation systems, extension of new road network, dyke construction across natural flow paths, the industrialization and urbanization along rivers and canals, sand exploitation, and upstream hydropower) is changing flood patterns (Hoang & Nguyen, 2008), concentrating flow paths, preventing sediments from replenishing floodplains and flushing sediments far out to sea- rather than contributing to coastal replenishment (IUCN – Mekong Water Dialogues, 2011);
- Climate change effects vary across the country. They increase river flows in the North and the northern area of North Central Coast, expand flood-ridden areas in the Mekong Delta due to long-term sea level rise (Sayers et al., 2016). And increase in the frequency and rainfall intensity of storms and typhoons, as well as increase the sea-forcing agents such as waves, wind, and longshore currents which lead to accelerated coastal erosion; and
- The cumulative impact that the above issues have in causing delta areas to sink faster than the sea level rises

## What does this mean for Vietnam's Textile Sector?

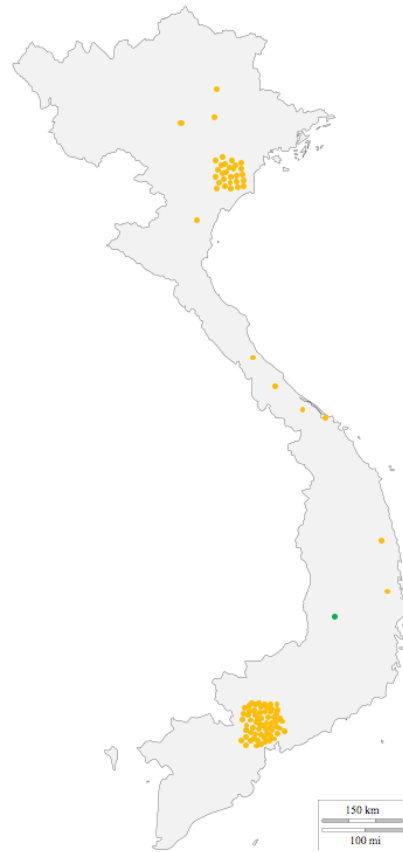
Major unusual flooding events may disrupt textile factory operations.

**Threats to the factories/brands** arising from this risk include:

- Floods may inundate factories in low lying areas
- Floods may impact transport routes to and from factories, and/or cut off supplies and/or access to the factory by its workers;
- This could lead to a disruption in factory operations through closures.

**Impacts from the factories/brands** that potentially exacerbate this risk include:

- Development of new factories, IPs, or industrial zones on reclaimed wetlands or areas of land built from sand that have been dredged from river beds may lead to brand reputational risk from being associated with development that has increased flood-damage risk for vulnerable communities.



## Level of risk for textile stakeholders in next 5 years:

- Direct flood damage unlikely for textiles factories given that (a) flooding in many low-lying parts of Vietnam is a normal and important natural phenomenon<sup>12</sup> and (b) factories do not report being impacted by any of the recent major flood events in Vietnam.

## What textile stakeholders said:

- All factories that were interviewed observed that their operations had not been affected by any recent major flood events.
- Although government agencies indicated their concern about the impact of floods on loss of life (especially in rural areas), they did not identify flooding as a major risk for textile factories.

<sup>12</sup> Transboundary floods associated with either the southwest monsoon (May-September) season or the later in the year tropical cyclones season can impose large socio-economic costs to the people of the Mekong (e.g. loss of lives and property, loss of livelihoods, decrease of purchasing and production power etc.). However, the environmental, social, and economic benefits of flooding (e.g. fish production, provision of nutrient rich sediments, recharge groundwater tables etc.) are considered to far outweigh the costs related to damages (UNESCO, 2015).



## Opportunities for mitigating the risk:

- a) Promote and apply strategic flood risk management principles (WWF, 2017) and the Vietnamese Government’s “Living with the Floods” concept within the textile and other industrial sectors including:
  - Promoting floodplains and some flooding as desirable in that they provide fertile agricultural land and promote a variety of ecosystem services;
  - Encouraging improved flood hazard/risk mapping and emergency planning/management to improve local community’s understanding of flood risk and reduce loss of life and injury in major flood events; and
- b) Integrate industrial expansion plans into integrated flood planning and wider river basin management planning that recognises the value of siting non-floodable industries (e.g. textile plants) in areas less prone to flood risks, whilst preserving high-risk flood areas for activities (e.g. agriculture) that benefit from the natural nutrient and soil replenishment processes that come with seasonal flooding.

## 4.2 Water governance and regulatory related risks

### 4.2.1 Complex or uncoordinated water planning and regulations

**Vietnam’s water risk** – this risk relates to the uncertainty and unpredictability arising from the complexity of Vietnam’s governance and regulatory water resource planning and management framework.

There are several factors contributing to the situation including:

- Economic planning in the Mekong Basin remains fragmented on three levels – between different countries in the river basin, between sectors either within or between countries, and between different development future timescales (MONRE & MARD, 2013);
- Intense competition exists between provinces and cities to attract industry for their economic growth, and a lack of harmonised planning leads to first class agricultural soils turned into industrial zones and significant land-use pressures due to agriculture, economic development, and affordable versus expensive housing (Nguyen et al., 2013);
- National and sub-national water utilisation strategies tend to be driven by sector-oriented agencies with tensions between economic development and natural resource sustainability objectives (Vietnam Environment Administration, 2011);
- Challenges remain in managing water resources within deltas (groundwater, river water, and floodplain resources) as single integrated systems (WWF, 2015); and
- Effective progress in IWRM is constrained at the basin level due to ambiguities in the governance responsibilities between MARD and MONRE and the roles of stakeholder bodies that they have established (such as the River Basin Organisations and the River Basin Environmental Protection Committees) (Nguyen, 2014). Ultimately, this is impacting inter-agency and inter-province effectiveness for tackling water allocation conflicts within and between river basins in a coordinated way.

## What does this mean for Vietnam's Textile Sector?

Governance and regulatory water resource management and planning frameworks are complex, fragmented, and administered by overlapping agencies, which creates an uncertain and challenging business investment climate for planning and growing textile factories.

**Threats to the factories/brands** arising from this risk include:

- Surface water and groundwater shortage risks are exacerbated by ineffective and/or inadequately-funded river basin planning that is prolonging the absence of water allocation limits, effective extraction controls, and leading to further over-exploitation of surface water resources;
- Surface water pollution risks are exacerbated by responsibility for pollution prevention and control being shared between DONREs, provincial-level Industrial Zone Authorities, and Infrastructure Development Companies which is leading to a failure in implementing identified environmental improvement measures and creating a confusing regulatory context for factories located within industrial zones, parks, or clusters; and
- Lack of coordinated controls to manage water allocation and water quality cumulative impacts between and across multiple sectors (including industry, domestic, agriculture, and others).

**Impacts from the factories/brands** that potentially exacerbate this risk include:

- Not applicable.



## Level of risk for textile stakeholders in next 5 years:

- Probable that this issue will affect expansion of existing textiles factories in all regions and the establishment of new ones.

## What textile stakeholders said:

- Existing factories were generally unconcerned with this issue as they are simply focussed on complying with the requirements of their environmental approvals, wastewater discharge permits, and water extraction entitlements;
- Factories within IPs indicated that approval processes for setting up new factories were easier in IP areas.

	<ul style="list-style-type: none"> <li>• Factories also saw new provisions relating to eco-industrial parks as an opportunity rather than a threat, as they will provide a means for them to demonstrate their green credentials to buyers.</li> <li>• Government agencies were clearly aware of the need to address overlaps and gaps in regulations and responsibilities (especially IWRM) and cited a number of examples of proposed draft decrees that will aim to do this.</li> <li>• MONRE observed that IWRM was challenging because some water users want to draw as much water as possible (to respond to growth and development pressures) whilst others wanted to limit levels of water extraction to maintain biodiversity.</li> <li>• MPI stated that it was difficult for policies to keep up with the rate of socio-economic development and change both within Vietnam- and globally.</li> </ul>
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**Opportunities for mitigating the risk:**

- a) Undertake a research project to comprehensively map variations and gaps in regional water governance (in terms of regulations, responsible agencies, planning, management, and enforcement) as they apply to textile businesses within the industrial zone, park, and cluster settings with the objective of identifying inconsistencies and areas of overlap for presentation by the sector to the government for its consideration and further governance reform;
- b) Based on this research, develop easy-to-read communication and training materials explaining how water regulations apply to textile factories in Vietnam, as well as specific differences applicable to each region; and
- c) Collate factsheets outlining examples of where and how national regulations are being applied effectively at the regional level as a means of highlighting positive stories as examples for other provinces to follow
- d) Engage in collaborative dialogue about the benefits of water governance reform via collective action platforms that help bridge the capacity gaps, promote the industries’ stake, and help identify win-win scenarios to reduce shared risks rather than just trying to comply with inadequate/obsolete laws which create barriers to innovation in sustainability.

## 4.2.2 Inconsistent or weak compliance and enforcement

**Vietnam's water risk** – this risk relates to state and provincial water resource management, compliance, and enforcement agencies interpreting and deploying regulations, compliance activities, or penalties inconsistently between regions or provinces.

Inconsistent application of monitoring and enforcement activities creates conditions that are likely to be conducive to higher levels of environmental non-compliance by factories and industries. Factors contributing to this risk include:

- Responsibilities in relation to water and environmental management regulations between national and provincial level agencies that either overlaps or are in conflict.
- Legislative powers are being devolved to provincial and city government levels which is leading to local variations in the way that regulations are being interpreted and applied;
- The complexity and number of regulations makes them difficult to interpret and are subject to limited effective regulatory oversight; and
- Resources for monitoring of wastewater discharge at provincial level is limited which means that efforts are prioritised on responding to complaints first; and
- There is a lack of incentive (and inadequate disincentives or penalties for non-compliance) to drive the adoption of environmental best practices by industry.

### What does this mean for Vietnam's Textile Sector?

Inconsistent or weak water and wastewater management, compliance, and enforcement leads to high levels of environmental non-compliance by the textile and other industries heightening reputational and water resource related risks for the textile sector.

**Threats to the factories/brands** arising from this risk include:

- Lack of enforcement and/or insufficient financial sanctions applied by agencies for factory environmental non-compliance or breaches creates an operating environment conducive to general non-compliance by industries (including Textiles); and
- Lack of technical or financial resources by government agencies leads to a backlog in issuing water and wastewater permits and an exposure by factories to uncertainty in their operating approvals.

**Impacts from the factories/brands** that potentially exacerbate this risk include:

- Non-compliance by factories with environmental regulations (including discharge of low quality wastewater to rivers) could lead to reputational risks.



<p><b>Level of risk for textile stakeholders in next 5 years:</b></p> <ul style="list-style-type: none"> <li>• Almost certain that this issue is already affecting all regions, particularly in the intensively industrialised Dong Nai and Sai Gon basins where government enforcement resources are stretched.</li> </ul>	<p><b>What textile stakeholders said:</b></p> <ul style="list-style-type: none"> <li>• One IP manager commented that there was still a large proportion of local factories that were unaccounted for in terms of the licenced versus actual (estimated) rates of wastewater discharge in the area;</li> <li>• Not surprisingly, no factories admitted to non-compliance with environmental approvals and did not cite lack of enforcement as an issue.</li> <li>• Government agencies remarked that limited resources (both in terms of available departmental funding and technical capability) meant that enforcement activities needed to be prioritised.</li> <li>• However, Vietnam Academy for Water Resources (VAWR) noted that larger and/or foreign-owned factories were generally subject to scrutiny whereas smaller factories were more likely to be under the radar.</li> <li>• The Vietnam Chamber of Commerce and Industry (VCCI) remarked that enforcement within the Mekong Delta was strong and that weaknesses relate more to policy gaps between- and lack of information about- plans at the local, provincial, and state level.</li> </ul>
<p><b>Opportunities for mitigating the risk:</b></p> <ol style="list-style-type: none"> <li>a) Identify and deploy potential sources of funding (including fees, charges, and penalties) to bolster resources and technical capabilities required to support short and long-term water-related enforcement, compliance, and reporting activities that are focused on the textile sector including factories that are outside of IPs or industrial zones and/or those that do not supply global textile brands; and</li> <li>b) Undertake research to examine the feasibility of self-regulation by the textile industry with the government potentially taking an oversight role.</li> <li>c) Present a united sectoral voice to the government about the value to industry of protecting water resources through strong and appropriately-funded monitoring and enforcement; and</li> <li>d) Explore innovative options (e.g. community based monitoring/whistle blower processes, publishing or blacklisting of conspicuously non-compliant factories, or removal of environmental approvals etc.) to expose current limitations in enforcement and encourage compliance by all sectors (per studies undertaken in Bangladesh) (DHI and MONRE, 2015).</li> </ol>	

## 4.3 Reputational risk

### 4.3.1 Reputational damage arising from poor water practices

**Vietnam's water risk** – this risk relates to the non-compliance with environmental regulations by some industries which may lead to the government implementing stricter regulation on all industries including textile factories, loss of social licence to operate, and/ loss of buyers.

Key factors contributing to this risk include:

- As local factories are obliged to comply with the central government's environmental regulations and operating under the local government's oversight, any violation of environmental regulations may, depending on the effectiveness of their implementation by government, may result in losing their business-operating license and risk being blacklisted by the government which might lead to difficulty in obtaining future licenses for business expansion (as occurred with Formosa, a foreign-owned steel company after a major water quality non-compliance).
- Poor environmental performance by individual factories might also create a negative reputational risk for brands associated with them.
- Local communities have a greater say due to their ability to make complaints to agencies and the media who reports the environmental and social performance of nearby businesses<sup>13</sup>. Factories that fail to perform – even in the short-term – are being exposed by the local community or media and may be subject to further monitoring by government agencies or the imposition of an immediate cease in business operations or remedy actions.
- The potential negative impact onto the environment of textile and wet processing factories might have a negative effect on the entire sector, resulting in stricter requirements or bans for the entire sector in selected provinces. For example, Ba Ria – Vung Tau, Dong Nai, Binh Duong and Hai Duong have added textiles to their list of conditional investment. Da Nang City, which is a tourism city, has refused two potential textile projects from Hong Kong and Korean investors for the same reason<sup>14</sup>.

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<sup>13</sup> It is required by the prevailing law that an investor must obtain comments from the local community on their EIA before submitting to the authorised agencies for comments. Given the recent Formosa incidents, local people have become more interested in the environmental compliance of enterprises. Local people play a very important and active role in monitoring the environmental impact of their nearby factories and report to the Environmental Police for investigation if finding signs of violation.

<sup>14</sup> <http://baodatviet.vn/kinh-te/doanh-nghiep/da-nang-tu-choi-200-trieu-usd-tu-det-nhuom-3238947/> accessed on 1 Nov 2017.



## What does this mean for Vietnam's Textile Sector?

Poor environmental performance by textile factories or their suppliers leads to the textile industry losing its social licence to operate in Vietnam.

**Threats to the factories/brands** arising from this risk include:

- Reputational damage “by association” due to non-compliance and/or major breaches by other non-textile related industries (especially international brands) with either environmental regulations or socially accepted norms for the care of workers and communities;
- The government increasing its application of stricter regulatory controls to reduce the environmental impact of all heavy polluting industries (where the textile sector may not be differentiated from other industries).
- The government restricting the issue of new operating licenses which constrains certain areas’ opportunities for business expansion in the textile sector.
- The government publishing blacklists of polluting or non-compliant companies that are exposed as key suppliers to Vietnam’s textile brands in local, national, or international media;
- Collateral reputational damage for textile factories and brands leading to the loss of their social licence to operate in parts of Vietnam;
- Damage to global brands, contraction in sales in the international markets, and loss in overall market share.

**Impacts from the factories/brands** that potentially exacerbate this risk include:

- Non-compliance by textile factories or key suppliers with environmental regulations;
- Deployment by textile factories or key suppliers of substandard onsite water and/or waste management practices which leads to the government implementing stricter controls, higher compliance costs for textile businesses, and collateral reputational damage for brands or the sector as a whole.



## Level of risk for textile

### stakeholders in next 5 years:

- Risk to brand is almost certain if one of their textile factories was found either to be in major non-compliance of its approvals or licences, or shown to be adopting poor practices that lead to unacceptable environmental impacts
- It's possible that this risk may extend beyond a single brand to the textile sector as a whole
- Collateral reputational damage to the textile sector is possible if a major water pollution incident were to occur involving a non-textile related factory.

## What textile stakeholders said:

- All factories appeared keenly aware of the importance of complying with environmental approvals or licences in order to not compromise future orders from major brands and buyers.
- Most factories and all government agencies were aware of reputational fall-out and consequences that arose from a recent major environmental pollution incident involving Formosa in 2016.
- MARD commented that if textile factories associated with a particular brand consistently demonstrated compliance with environmental requirements at the local level, the provincial Peoples' Committee will note this and report it to central agencies, suggesting that others follow the brand's lead. They also added that brands systematically performing well at a local level could lead to doors being opened at the highest level to discussion (even the Prime Minister's office). A weather measurement company was cited as an example (the name of company was withheld).
- The VITAS noted that Corporate Social Responsibility (CSR) was a stronger driver of improvement in Vietnam's textile factories than elsewhere, and that CSR requirements are driving the capacity building of factories through projects funded by the government or donors (including Japan and Korea) and training in 4 topics: mechanisation, design, manufacturing, and wastewater treatment.

## Opportunities for mitigating the risk:

The recommendations in other sections are relevant to the mitigation of this risk. In addition:

- a) Explore and deploy ways of celebrating, publicly promoting, and perhaps accrediting exemplary performers within Textiles and other sectors;
- b) Similarly, show-case improvements and successes in government compliance and industry self-regulation;
- c) Examine ways of translating such accreditations to preferential banking conditions, tax breaks, or other concessions to businesses that are likely to provide positive incentives for factories to improve their performance.

## 4.4 Transboundary risk

### 4.4.1 Transboundary water planning, development and management decisions

**Vietnam's water risk** – this risk relates to suboptimal water development and management decisions in transboundary river basins upstream of Vietnam, potentially resulting in loss of river flows, sediment loads, land, fisheries, agricultural production, livelihoods and food security in Vietnam, and destabilising the social-economic environment throughout the region.

Factors contributing to this risk include:

- Upstream hydropower development projects, flood control, agriculture, roads, and irrigation infrastructure as well as industrialization and urbanization along the main stem. Floodplains and tributaries of the Mekong River are causing wetland degradation, increasing bank erosion, obstructing of fish migratory routes, fragmenting the aquatic habitat, and degrading the water quality, quantity, and turbidity (Hoang & Nguyen, 2008; One World – Nations Online Project). It will also result in a 50% decline in fishery capture yields in both Vietnam and Cambodia (One World – Nations Online Project).
- Over-extraction of water from the upstream reaches of the Mekong River, plus unsuitable flow releases from upstream hydropower reservoirs reduce river flows to the Mekong Delta and cause reduced low flows in the dry season (British Water, 2017); this reduces soil moisture availability, impacting the effectiveness of irrigation. It also leads to seawater moving up from the river mouth causing an impact on water quality and supplies for agriculture, freshwater fisheries, and domestic and industrial use (MONRE and MARD, 2013).
- Reduction in dry season flows from transboundary river systems is compounding the effects of over-extraction of groundwater; accelerating the processes that cause the ground within delta areas to sink; the loss of land to the sea and estuaries; exacerbating loss of water from delta rivers to aquifer systems (which reduce river flows further); and impacting the wetlands and ecosystem function during the dry season (Delta Alliance, 2011);
- In-channel sand mining and uncontrolled dredging within the transboundary river systems is significantly decreasing sediment loads flowing down the river to counteract erosion. This accelerates subsidence of delta land, deepening the Mekong River channels, driving large-scale river bank erosion, causing the recession of the delta shoreline and the loss of prime agricultural land, property (private houses), and infrastructure (roads, bridges).
- Reduction in flooding due to upstream transboundary development and hydropower dams in the Mekong and Red River Basins is also reducing beneficial silt loads into Vietnam which is resulting in the elimination of bed loads, reduction of wash loads, and bed and bank erosion downstream. Reducing sediments and nutrients upstream of Vietnam also significantly impacts food production (including rice and fisheries) in the Mekong Delta for domestic consumption and the export economy (MONRE and MARD, 2013).
- Decision-making about hydropower plant developments that do not consider natural resource management, environmental, or social implications at a basin-wide, transboundary scale is grounded in a lack of effective formal collaborative arrangements or a clear, binding legal supporting framework between sovereign governments or administrative authorities (Vietnam Environment Administration, 2011).

- In the Mekong River Basin, climate change is expected to result in delays of monsoon rains and reduced upstream water flows to below 70% of the average; resulting in saltwater intruding very far inland in the Mekong Delta and further impacting groundwater quality and availability (British Water, 2017). Climate change is also expected to increase sea levels adding to significant loss of land in the coastal and estuarine areas (Sayers et al., 2016).
- Collectively the reduction of sediment delivery from the Mekong (caused by hydropower and sand mining) plus over-extraction of groundwater plus loss of mangroves due to aquaculture) and climate change all cumulatively contribute to increased salt intrusion, reduced water availability, increased erosion, and increased flooding in the delta. This in turn is causing increased migrations of people from the rural provinces of the Mekong Delta to Ho Chi Minh City with wide ranging socio-economic implications relevant to all industries including textile brands.

## What does this mean for Vietnam's Textile Sector?

Sub-optimal water planning, development, and management decisions in transboundary river basins upstream of Vietnam degrades land and water resources in the downstream delta areas within Vietnam, impacting the stability of the social-economic environment throughout the region and the productivity of textile factories and other economic sectors which have high dependency on river resources.

**Threats to the factories/brands** arising from this risk include:

- Loss of land, fisheries, agricultural production, and food security in the Mekong Delta area would lead to the need to supply southern Vietnam's food and other needs from elsewhere (which would put upward cost pressure on living essentials);
- Although loss of jobs and livelihoods in the agricultural sector might decrease the cost of labour in the region (and favour non-primary production industries), unemployment would soar leading to social challenges, increased cost pressures on government, and higher government charges and taxes;
- This may, in turn, lead to increased pressure to facilitate further growth and employment in industries that place greater demands on water resources and energy sources (which in turn leads to greater dependencies on hydropower generation).
- The total socio-economic costs of doing business in affected areas of Vietnam would become less competitive than in other areas of Vietnam or other countries in southern



<p>Asia.</p> <p><b>Impacts from the factories/brands</b> that potentially exacerbate this risk include:</p> <ul style="list-style-type: none"> <li>• Lack of awareness of the importance of orderly and well-informed transboundary river basin planning for the future stability and security of the region and the industries; and</li> <li>• International brands missing opportunities to partner and present a united voice in promoting the value to industry of pursuing collaborative international planning and decision-making about water-related issues.</li> </ul>	
<p><b>Level of risk for textile stakeholders in next 5 years:</b></p> <ul style="list-style-type: none"> <li>• Probable in the downstream reaches of the Mekong Delta; and</li> <li>• Possible in other transboundary rivers flowing into Vietnam (e.g. Red Thai Binh Basin);</li> </ul>	<p><b>What textile stakeholders said:</b></p> <ul style="list-style-type: none"> <li>• Factories were unaware of what transboundary risk was and did not comment on it when prompted.</li> <li>• Government agencies were generally unable to discuss transboundary risk as this was seen as a political, high-level government matter. However, VAWR observed that transboundary water planning-related modelling was being thwarted by the lack of sharing of data between agencies of different countries. Although the MRC is likely to have access to such data, VAWR noted that this is not shared back to Vietnamese agencies.</li> <li>• The South-West Steering Committee of Vietnam was concerned about the impact of water-use in upstream transboundary countries on water-use lower Vietnam.</li> </ul>
<p><b>Opportunities for mitigating the risk:</b></p> <ol style="list-style-type: none"> <li>a) Develop awareness of the transboundary water risks and management opportunities for national and international textile businesses operating within the region and the benefits of collaboratively sharing data, and developing and implementing integrated river basin planning processes across the transboundary river systems that intersect with Vietnam (Red River and Mekong River Basins); and</li> <li>b) Assist in identifying key criteria – relevant to the sustainability of the textile industry – against which to assess and report the performance of integrated river basin plans and the planning and decision-making agencies responsible for their development and implementation.</li> </ol>	

# 5. Strategic Roadmap

## Strategic Roadmap Introduction

- Water risks are being recognised as a strategic threat to textile and garment factories.
- Through three drivers of risks- physical, governance/regulatory and reputation- textile and garment factories are going to be exposed to a wide array of the discussed risks.
- Some risks are high level while others are assessed as medium level.
- The rapidly growing textile and garment sector is the most important sector of the Vietnamese economy.
- In recognition of the impact that industrial operations have had on water resources in Vietnam, the country's green growth strategy underpins the importance of saving resources in industrial production.
- However, given the enforcement challenges in Vietnam, the implementation of such strategy and others related to industrial production standards, cleaner production, and clean technologies is likely to be highly variable.
- Given the water risks challenges discussed above, this section presents a roadmap of recommendations, timeframes and specific actions for addressing these risks.



#	Recommendations	Time frame*	Specific actions
1	<p>Establish a multi-sector “Lancang-Mekong River Stewardship Collective” to provide input to and engage with the six-country Lancang-Mekong Cooperation about river-related risks and opportunities within the investment and development context of the Belt and Road Initiative</p>	Short-term	<ul style="list-style-type: none"> <li>• Convene a forum in 2019 to map out the common issues, risks and needs of textile and other industry sectors whose supply chains rely on robust governance, holistic planning, sustainable management, sound regulation and rigorous enforcement of rivers and river-related resources.</li> <li>• Identify river-related risks, opportunities and strategic actions for industries that are likely to arise from current and proposed investments under the Belt and Road Initiative.</li> <li>• Utilise the recent learnings about the water-related physical, governance, reputational and transboundary risks confronting the textile sector in Vietnam as a case study to raise the awareness of other industries about the need to manage such risks and secure support for a plan of action by a broad-based stewardship collective. This should include: <ul style="list-style-type: none"> <li>○ Developing awareness of the transboundary water risks and management opportunities by national and international businesses operating within the region</li> <li>○ Promoting the benefits from collaborative development and implementation of integrated river basin planning processes across the transboundary river systems that intersect with Vietnam (Red River and Mekong River basins)</li> <li>○ Identifying key criteria against which to assess and report the performance of integrated river basin plans and of the planning and decision-making</li> </ul> </li> </ul>

#	Recommendations	Time frame*	Specific actions
2	Establish a textile sector water partnership (made up of representatives of major brands operating within Vietnam, their suppliers and other key stakeholders) to coordinate the sector's interactions with the proposed multi-sector collective	Short-term	<ul style="list-style-type: none"> <li>• agencies responsible for their development and implementation               <ul style="list-style-type: none"> <li>○ Identifying other transboundary and national opportunities to achieve SDGs that are relevant to the global textiles industry and</li> </ul> </li> <li>• Seeking CSR contributions by industries and/or their financiers towards private/public partnership funding that aims to address current critical gaps in technical capacity that is limiting the development and deployment of data collection / storage / analysis tools that are essential to effective uptake of transboundary integrated river basin planning processes</li> <li>• Form and use a partnership to promote and coordinate implementation of the roadmap by involving all textile businesses within Vietnam, VITAS, WWF and other NGOs, government agencies and research institutions, sector associations, and development agencies, donors and direct foreign investors</li> <li>• Utilise the partnership to foster communications across textiles businesses, share data and lessons, and advocate for business to dialogue and engage with government economic planners and establish a bridge with water resource planners to better manage water-related risks and opportunities across the country and the entire connected transboundary region.</li> <li>• Use the partnership to encourage investors in the textiles industry to explore financial conditions (including loan guarantees) and technical support to facilitate adoption of</li> </ul>

#	Recommendations	Time frame*	Specific actions
			<ul style="list-style-type: none"> <li>improved practices by their customers as well as requiring disclosure on the strategic and operational business risks faced by their clients</li> <li>Prepare sector-level joint communications that identify and profile factories and brands where monitoring has shown are exemplar performers against water and wastewater management standards</li> <li>Seek CSR contributions by brands and/or their financiers towards creating a basket fund to seed-fund better, publicly-available data on key water parameters, including monitoring, risk mapping and research to inform improved strategic flood and drought management planning.</li> </ul>
3	Engage textile factories in adopting water saving and use efficiency management activities to better comply with brands' requirements, be more environmental friendly and facilitate comparison against the environmental performance of other sectors	Short-term	<ul style="list-style-type: none"> <li>Stocktake water usage and saving activities at factory level</li> <li>Introduce factories to water saving management practices that can be applied at factories along the textile value chain and allow comparison with the practices of other industries and sectors</li> <li>Select and engage factories in a water saving management program with a non-financial incentive mechanism</li> <li>Monitor the water usage by participating factories to establish an industry benchmark whilst aligning with existing deployment within the sector of Higg Index and ZDHC monitoring and reporting</li> <li>Further promote water saving practices across the sector through brands, existing programs and associations</li> </ul>
4	Conduct capacity building activities to	Short-term	<ul style="list-style-type: none"> <li>Provide training to factory leaders on best practices in</li> </ul>

#	Recommendations	Time frame*	Specific actions
	equip relevant stakeholders in the textiles industry with necessary knowledge on how to adopt water saving practices		<ul style="list-style-type: none"> <li>water usage and saving in factories</li> <li>Provide training to factory technical staff on measures to improve water usage efficiency</li> <li>Provide awareness raising campaign to factory workers on water saving practices</li> <li>Provide training to government officials on water risks and impacts on the basin</li> <li>Develop and promote a system of certification, training and monitoring that factories can use to demonstrate their achievement of these standards when negotiating orders with buyers and back-filling orders with other factories</li> </ul>
5	Engage textile factories in adopting best practices in chemicals and waste water management to improve surface water quality	Short-term	<ul style="list-style-type: none"> <li>Stock-take water discharge and chemical usage activities at factory level</li> <li>Share existing best practices in chemical and waste water management with factories (ZHDC, rationalization of chemical use...) in alignment with existing government requirements</li> <li>Select and support factories to apply wastewater discharge limits (ZDHC mid or high level)</li> <li>Select and support factories to upgrade of water treatment infrastructure/applying tertiary or zero liquid discharge (ZLD) technology (energy trade-offs, need to also look at renewables)</li> </ul>
6	Introduce water saving and efficiencies to IPs to promote collective best-practice water saving and wastewater management actions	Short-term	<ul style="list-style-type: none"> <li>Dialogue with MPI, UNIDO project on Eco-IP and IFC to introduce water saving and wastewater management practices in IP.</li> <li>The UNIDO on-going project assists MPI in developing eco industrial park standards which will be</li> </ul>

#	Recommendations	Time frame*	Specific actions
7	Support Government to develop a smart water use program for textile sector to promote water efficient practices and technology countrywide	Short-term	<ul style="list-style-type: none"> <li>• Work with the Government to develop a program aiming to incentivise or encourage factories to transition to water efficient practices, technologies and recycling – in those areas that are likely to be impacted by severe drought and where there are significant surface water extractions by factories</li> <li>• Support the Government to adopt market-based approaches that improve river resources management by incentivising appropriate and dis-incentivising perverse business behaviour, by realigning markets that negatively affect the river basins</li> </ul>
8	Publish documents on water use efficiency to share and promote examples of good practices in textile industry water use	Medium-term	<ul style="list-style-type: none"> <li>• Document best practices in water saving management practices in textile sector in Vietnam</li> <li>• Report and benchmark textile water use efficiency between factories to identify and target those factories warranting improvement</li> <li>• Publish factsheets that identify ways that factories can</li> </ul>

#	Recommendations	Time frame*	Specific actions
9	Promote national reporting against sector-based standards to demonstrate and promote the textile's good performance and reputation in managing wastewater and water quality	Medium-term	<ul style="list-style-type: none"> <li>improve their water use efficiency, the benefits of investing in such improvements, and technology and investment partners to assist in the transition</li> <li>Develop consistent water quality discharge standards and monitoring practices across the textile sector that are based on "best in class" wastewater discharge limits (ZDHC mid or high level) and that also equals or exceeds government requirements;</li> <li>Adopt achievement of these textile sector water quality discharge standards as an industry standard that applies to all textile exports from Vietnam;</li> <li>Establish a national platform that enables benchmarking of wastewater discharge water quality between factories as well as against other polluting industries.</li> <li>The IDH's Race to the Top (RTTT) has succeeded in a public private dialogue with Ministry of Industry and Commerce following its agenda aiming to increase the competitiveness of Vietnam's textile and garment sector. WWF should therefore discuss with IDH team to discuss a possible setting up of a joint effort working on the environmental issues of the country's textile and garment sector</li> </ul>
10	Promote knowledge management in water governance to facilitate sector players' better understanding of relevant policies and standards related to water	Medium-term	<ul style="list-style-type: none"> <li>Develop easy-to-read communication and training materials explaining how water regulations apply to textile factories in Vietnam, as well as specific differences applicable to each region</li> <li>Collate factsheets outlining examples of where and how</li> </ul>



#	Recommendations	Time frame*	Specific actions
			national regulations are being applied effectively at the regional level as a means of highlighting positive stories as examples for other provinces to follow
11	Develop a smart water use supporting fund to support and reward textile factories adopting water efficient and clean technology	Long-term	<ul style="list-style-type: none"> <li>Advocate for and create funding/financing mechanisms or incentives to support investment in clean technology including retrofitting to existing factories</li> <li>Engage relevant stakeholders in the development and management of the fund, i.e. Government, Association, Brands and NGOs, global providers of clean water/wastewater technologies</li> </ul>
12	Support Government in developing water governance policy in alignment with international standards	Long-term	<ul style="list-style-type: none"> <li>Support a research project to comprehensively map variations in regional water governance (in terms of regulations, responsible agencies, planning, management and enforcement) as they apply to textile businesses within the industrial zone, park and cluster settings with the objective of identifying gaps, inconsistencies and areas of overlap for presentation by the sector to government for its consideration and further reform <ul style="list-style-type: none"> <li>Introduce international standards on waste water management and water usage and internationally recognised certifications (ZHDC, Higg Index) to the Government and identify the gaps between the regulatory standards and international best practices</li> <li>Discuss with the Government the possibility to align regulatory standards with international best practices or formally endorse internationally recognised certification programs</li> </ul> </li> </ul>

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## Appendix 2 - List of stakeholders interviewed to collect information for the report drafting

<b>Government agencies and entities</b>
Department of Water Resources Management (MONRE), Hanoi
Directorate of Water Resources, Department of Water Resources and Rural Water Supply Management, MARD, Hanoi
Department of Economic Zones Management, Ministry of Planning and Investment (MPI), Hanoi
International Water Consultant working for the Belgium Development Cooperation, Hanoi
Vietnam Academy for Water Resources (VAWR within MARD), Hanoi
Vietnam Chamber of Commerce and Industry, Can Tho
Southwest Steering Committee of Vietnam, Can Tho
Can Tho Industrial Park / Industrial Zone Wastewater Treatment Plans
Vietnam Textile and Apparel Association, HCMC
Southern Institute of Water Resources Research, HCMC

<b>Textile and garment companies</b>	<b>Ownership</b>	<b>Location</b>
Esquel Garment Manufacturing (Vietnam) Co. Ltd.	FDI	Dong Nai
DOMEX (QUANG NAM) CO., LTD	FDI	Quang Nam
Hoa Tho Textile - Garment Joint Stock Corporation	Vietnam	Danang
Regina Miracle International (Vietnam) Co., Limited	FDI	Hai Phong
Hung Yen Knitting & Dyeing Co., Ltd	FDI	Hung Yen
Fashion Garments 2 Co. Ltd	FDI	Dong Nai
Smart Shirts Knitting Garments MFG	FDI	Hung Yen
Phong Phu Corporation	Vietnam	HCMC
Phong Phu International	Vietnam	HCMC
Việt Thắng JSC	Vietnam	HCMC
Saitex International Dong Nai (VN) Ltd.	FDI	Dong Nai
Dong Jin Textile Vina Co., Ltd (Factory 1)	FDI	Dong Nai
Thành Công JSC	Vietnam	HCMC
Đông Phương Waving CO., LTD	Vietnam	Long An
Liên Phương Garment and Textile Co	Vietnam	HCMC
Len Việt Nam	Vietnam	HCMC

Eins Vina I, II, III	FDI	Binh Duong
Padmac Vietnam Co., LTD	FDI	Nam Dinh
Junzhen Garment Co., LTD	FDI	Nam Dinh