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Water Footprint Assessment of washing-dyeing-finishing mills in China & Bangladesh

C&A Foundation

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The results and findings of this report are based on scientific analysis done by Water Footprint Network. All the internal data from C&A are provided solely to be used in this report. The partners of the initiative consider it a living document that will be adapted to the circumstances based on new findings and concepts, future experiences and lessons learnt.

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Working together with and supported by hundreds of partners worldwide, we drive action towards sustainable, efficient and equitable water use, build communities to escalate change in river basins, share knowledge and train practitioners to solve the world's water crises.

As the global leader in Water Footprint Assessment, we find solutions using a common methodology that interlinks water related issues and leads to strategic action for water stewardship, resource efficiency, fair allocation and good governance. Our data, tools and Global Water Footprint Standard bridge sectors and viewpoints, illuminate the path towards integrated water resource management and accelerate progress towards sustainable development.

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Executive summary

Water sustainability in textile washing-dyeing-finishing mills

Water scarcity and water pollution levels are increasing in river basins around the world due to growing populations, changing consumption patterns and poor water governance. This imposes risk to the apparel sector, which increasingly faces water availability and quality challenges in its widely-distributed supply chain. Therefore, achieving water sustainability in the apparel supply chain is critical for the long-term viability of the sector as well as the sustainability of ecosystems and communities that are dependent the same water resources.

Reductions in the consumption and pollution of water resources in the supply-chain of the apparel sector will lead to greater water security for businesses and are necessary for its water use to be sustainable, efficient and equitable.

Water Footprint Network[1] assessed water consumption and pollution in the washing-dyeing-finishing stage of the supply chain of the global clothing retailer C&A, starting in 2013 and 2014. The assessment quantified the water consumption of 53 washing-dyeing-finishing mills located in Bangladesh and China in terms of the water consumed per unit of product produced and the total annual water consumption. The first measurement showed how efficiently the mills used water and the second measurement considered the mills' contribution to local water issues such as groundwater decline. Water scarcity and pollution levels in the water bodies where effluent from the mills is discharged were also assessed to understand local water conditions that can affect the mills' water sustainability.

This holistic approach identified the most prominent water-related challenges and relevant risks that washing-dyeing-finishing mills, brands and retailers may face and provided insights into the steps needed for the apparel sector to achieve a sustainable supply chain from the perspective of water.

[1] This study was made possible thanks to a grant from C&A Foundation.

1 Better water metering and monitoring is crucial in identifying the right actions for water sustainability

One of the challenges during the study was to obtain adequate and reliable water related data from the mills. This also hampered accurate measurement of the effects of any measures implemented by the mill to improve water efficiency.

Therefore, the first step needed in addressing water sustainability in washing-dyeing-finishing mills is to promote the installation of water meters at the entrance to the facility and at the process level and the establishment of proper water accounting systems within the mills. Water meters should also be installed to monitor water use in individual processes, particularly before and after dye machines or washing units.

The study showed that in 2013-2014, effluent quality parameters tested by the mills were limited to BOD (biological oxygen demand), COD (chemical oxygen demand), pH, colour, TSS (total suspended solids) and TDS (total dissolved solids) and did not include other chemicals that are frequently discharged by the mills such as sulphur, copper, chromium, manganese and lead.

Monitoring of water quality should include the full suite of relevant indicators to ensure that the full range of water quality impacts on local water resources are accurately measured.

2 Excessive water use has environmental, social and economic consequences

Water consumption at washing-dyeing-finishing mills is proportionally smaller than at the raw materials stage of textile, however, the location of the mills and their water supply can significantly increase the impacts of this water use. For example, in the case of washing-dyeing-finishing mills in Bangladesh, water is abstracted from limited groundwater resources and discharged to surface water.

Sustained groundwater abstraction from aquifers by proximal mills, such as found in the textile clusters in and around Dhaka, Bangladesh, is causing long term groundwater level decline. This can have negative environmental, social and economic effects such as: permanent reduction of groundwater table levels; drying of wetlands in the dry season resulting in loss of wetland-dependent species, contamination of the domestic water supply by arsenic and other pollutants, decreased accessibility to water for communities and increased pumping costs to industries and households2.

The specific characteristics of water sources used by washing-dyeing-finishing mills and the management of water withdrawals and discharges must be understood when assessing the sustainability of a mill's practices related to water.

[2] Konabari Cluster Water Footprint Assessment Report prepared by Water Footprint Network to understand impacts of water use and pollution by washing-dyeing-finishing mills in Konabari areas in Bangladesh.

3 Water pollution is a critical issue

The major impact of washing-dyeing-finishing mills on water resources is the chemicals they discharge through their effluent with most of the chemicals originating from the dyeing of the fabric. The release of improperly treated wastewater discharge can lead to human health impacts due to exposure to polluted water and contaminated fish. Heavy metals can accumulate in vegetables and crops grown in the areas surrounding washing-dyeing-finishing mills through contamination of soil and sediments due to inadequate wastewater treatment and inappropriate disposal of waste.

Implementing cleaner production measures within the mills such as reduction in chemical usage and substituting alternative dyes and improved efficiency in effluent treatment plants are important actions for reducing the degradation of water quality caused by washing-dyeing-finishing mills.

4 Water pollution is also a reason for groundwater decline

Since rivers are heavily polluted around Dhaka, Bangladesh, washing-dyeing-finishing mills extract higher quality water from groundwater resources. Improving the quality of river water would open the possibility of abstracting from surface waters rather than groundwater. This would reduce the pressure on local groundwater resources and would reduce the overall water consumption of mills by returning treated wastewater to the same source it was withdrawn from.

Improving surface water quality can be one solution to unsustainable groundwater withdrawals.

5 Improving water efficiency requires in-depth analysis

The amount of water consumed in processing a kilogram of fabric in the washing-dyeing-finishing mills included in the study showed large differences between mills, from 50 litres to 450 litres. Since water use was not measured for each process and the specific processes used, the resulting colour and the fabric types were not known, the relationships between these factors and water consumption could not be assessed. To understand these relationships and to identify the appropriate measures, e.g., technology, practices, inputs, etc., that will improve water use efficiency, more detailed measurement and data collection is required.

As washing-dyeing-finishing mills, brands and retailers commit to targets for water use efficiency, these should be based on benchmarks for best performance. The number of mills included in this study and the limited data did not allow analysis of potential benchmarks, which must be reflective of the specific processes used and products produced. Further study should be invested in to provide the data necessary for the industry to set appropriate performance targets for mills.

6 Water efficiency is only one part of water sustainability

Water efficiency, e.g. water use per kilogram of fabric, is often the only indicator used to assess water sustainability in washing-dyeing-finishing mills and targets set by brands and retailers are frequently aimed at improving the efficiency of water use. This is a limiting view since it does not consider the total amount of water withdrawn from the water resource and not returned for other uses, that is, the total water consumed by the washing-dyeing-finishing mill. This annual water consumption contributes to water scarcity issues, such as groundwater decline in Bangladesh.

When evaluating the sustainability of water consumption at washing-dyeing-finishing mills, it is important to know both the water efficiency of the production at the mill and the total production amounts. Together these indicate the total water consumption for the mill. A mill can be very efficient in water use per unit production but if it is a large producer, it may be a major contributor to local water scarcity and groundwater declines. Therefore, it is insufficient to improve the efficiency of water use; it is also necessary to understand the total volume of water consumed and the relation of this to local water availability to ascertain the sustainability of the mill's production.

A rebound effect can be observed if a mill invests in water efficiency, but then increases its production. Overall water use reduction can only be achieved through water reuse and recycling together with water efficiency gains through technological and process improvements.

When setting targets for improved performance at mills, it is necessary to include both water efficiency as well as total water consumption. The interplay between the two then needs to be assessed within the local context to determine the sustainability of production related to water.

7 Mills are located where water scarcity and water pollution are critical issues

The study revealed that almost all the mills are located in areas with existing water scarcity and water pollution problems. These local problems are a result of the mills' water abstraction or wastewater discharge as well as that of other local and upstream activities such as other industries, agriculture and/or households. Local water issues can impose a risk to the mills, and consequently to the brands and retailers that are sourcing garments from the mills. These risks can be physical, such as decreased water availability and increased costs to access clean water, but they may also be regulatory and/or reputational in nature. Therefore, local water issues should be taken into consideration while assessing water sustainability within the supply chain.

8 Collective action is essential in addressing water sustainability

Focusing only on improvements at washing-dyeing-finishing mills may not be sufficient to achieve the overall water sustainability required to claim sustainable sourcing at this stage of the supply chain. Problems of water scarcity and poor water quality are the cumulative impact of many water users as well as inadequate regulations, compliance and enforcement.

Most of the mills included in this assessment are in areas with water scarcity and/or pollution problems. As rainfall patterns change over time due to climate change and population growth and economic development, this will put more pressure on limited water resources, and these levels of water scarcity and water pollution may worsen. While improvements at the mills themselves can reduce the pressure they put on freshwater resources if production levels remain stable, engagement with other water users, regulatory authorities and key stakeholders will be required to improve the local water conditions.

A holistic approach to reducing water scarcity and water pollution implemented with other water users is crucial to recover sustainable levels of water use and water quality. Brands and retailers, and their suppliers, will need to work together with others to achieve environmental, social and economic sustainability.

9 Sector initiatives can help achieve water sustainability

Participation in programmes like Bangladesh Partnership for Cleaner Textile (PACT)[3] and the Better Mills Initiative can help brands and retailers collectively to address water issues with their washing-dyeing-finishing suppliers and achieve sustainability from the water perspective. For example, Cleaner Production Assessments helped Bangladeshi mills significantly reduce their water consumption per kilogram of fabric, up to 40%, without high investment costs. In addition, such programmes increased water awareness within washing-dyeing-finishing mills and promoted collective action, such as stakeholder meetings and joint action programmes, which have helped in finding solutions to water related problems. Lessons learnt from the outcomes of these initiatives can also be applied to other mills located nearby and elsewhere.

Participation in sector-wide initiatives such as Zero Discharge of Hazardous Chemical (ZDHC) can be instrumental in collectively addressing key aspects of water sustainability and can provide guidance and practical information about how to improve the sustainability of the washing-dyeing-finishing phase of the apparel supply chain.

As brands and retailers aim for sustainable sourcing in their supply chain, it is crucial to work with suppliers to measure, monitor and report accurate and detailed data that can be used to pinpoint the most meaningful and strategic investments in improving technology, practices and inputs. Additionally, brands and retailers need to support collective action in water stewardship to ensure that the water resources their suppliers depend upon are managed sustainably. By working together to address both water consumption and pollution and improving water efficiency as well as local water conditions, the sector, as a whole, can create social, economic and environmental benefits.

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[3] PaCT: Partnership for Cleaner Textile in Bangladesh, a programme initiated by IFC to achieve water sustainability in washing-dyeing-finishing mills

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