Southeast Asia Apparel Water Action

Summary Report (October 2012)

Background

In 2011, the CEO Water Mandate and UN Environment Programme (UNEP) launched the Southeast Asia Apparel Water Action, also known as SEAAWA. This collective action project aimed to bring together the Mandate Secretariat, Mandate endorsing companies from the apparel sector, their suppliers, UNEP, and local civil society and government representatives to drive water use efficiency and reduce pollution in apparel laundering and finishing facilities in Vietnam and Cambodia. The project's overarching goal was to build awareness and capacity to enhance water management among apparel suppliers in the region, so as to mitigate business' water-related risks to brands, reduce costs for suppliers, and improve the water conditions in the region. In pursuit of this goal, SEAAWA sought to:

- Identify, share, and implement good water management tools and practices specific to the apparel industry,
- Facilitate better communication among apparel companies and their suppliers, and
- Foster cooperative relationships among apparel companies and their stakeholders in the region to address shared water risks.

The SEAAWA Project Team was composed of the CEO Water Mandate Secretariat, the UNEP, and local implementing partner Vietnam Cleaner Production Center (VNCPC). Mandate-endorsing apparel companies – H&M, Levi's, Nautica, and Nike – agreed to participate in the this supply-chain focused project, playing a role in directing and shaping its core objectives and engaging with and encouraging improvements in its suppliers in the region. The Pacific Institute – representing the CEO Water the Mandate Secretariat – oversaw project development and scoping, led project research on good practices, coordinated the training workshops, and interfaced with the brands, UNEP, and on-the-ground implementing partner.

The on-the-ground collective action was comprised of two main stages: 1) training workshops in Vietnam and Cambodia meant to encourage the uptake of good practices in the apparel industry supply chain and 2) technical assistance and implementation of good practices at select apparel suppliers, conducted by VNCPC

Summary and Key Findings from Training Workshops

In July 2011, the Mandate and UNEP convened training workshops in Ho Chi Minh City, Vietnam and Phnom Penh, Cambodia. These workshops brought together representatives from apparel brands, suppliers, civil society groups, and government agencies to discuss the importance of water to business

generally and the growing water-related challenges facing the apparel industry specifically and to share good water management practices specific to the apparel industry.

In advance of these meetings, the Mandate and UNEP compiled good water management practices, specific to apparel laundering/finishing facilities based on a survey of available research and input from the four participating brands. A wide range of practices were featured, including some pertaining to internal governance, monitoring, recycling/reuse, single-process and multiple-process optimization, and treatment. An overview of these practices can be found in Appendix A.

The Vietnam Workshop, held in Ho Chi Minh City on July 26, 2010 featured a wide range of presentations. Maite Aldaya (UN Environment Programme) and Jason Morrison (Pacific Institute / CEO Water Mandate) discussed the importance of water to business as well as the drivers and objectives of this project. The VNCPC shared its experience with water efficiency and pollution reduction measures among apparel facilities, identifying specific examples of low cost improvements. WWF shared its work in Southeast Asia on restoring and maintaining healthy aquatic ecosystems. The workshop also featured presentations from the participating brands, their suppliers, and representatives from the Institute for Water and Environmental Technology – Ho Chi Minh City, University of Technology of Ho Chi Minh City and the University of Natural Resources and Environment of Ho Chi Minh City focused on underscoring the importance of improve industrial water management and examining ways in which local suppliers can do so, even with limited funding.

The Cambodia Workshop, held in Phnom Penh, Cambodia on July 28, 2010, was similar, opening with presentations from Ms. Aldaya and Mr. Morrison, WWF, and representatives from the participating brands and their suppliers. Further, His Excellency Ek Sonn Chan, General Director of the Phnom Penh Water Supply Authority, gave a talk about the Authority and its impressive development since 1993. Mr. Sok Chea Hak (UNIDO) discussed the Hotspots and transfer of environmentally sound technologies (TEST) project that seeks to identify, assess, and improve pollution hotspots in the Cambodian section of the Mekong river basin.

Common threads and key messages from these meetings, included:

- Though the Mekong Basin currently has an abundant quantity of water, cleaner production is incredibly helpful in reducing pollution (and therefore supporting healthy communities and ecosystems) and preventing future water shortages.
- There are a wide range of water efficiency and pollution reduction practices that require little-to-no upfront investment and result in immediate cost savings.
- In addition to these “low-hanging fruit”, there are many technologies that, despite relatively high upfront costs, have a payback period of less than one year.
- Many Vietnamese and Cambodian apparel facilities are just beginning to consider cleaner production related to water. For this reason, further awareness and capacity building is needed.
- Public agencies can play a role in building awareness and helping facilities identify and implement good practices and technologies.
- Many companies and suppliers are potentially interested in collaborating on projects that support the well-being of the Mekong Basin in the future.

Group discussion at the workshops further stressed that a large portion of Vietnamese and Cambodian apparel facilities could still benefit from basic awareness building related to water sustainability, and that there are a wide range of “low hanging fruit” to be seized. Technologies and other practices with

large up-front costs are likely more appropriate in the future once these basic practices are being fully implemented.

Summary and Key Findings from Technical Assistance

After the workshops, VNCPC conducted a series of visits to one supplier for each of the four participating brands in order to assess their water use and wastewater discharge, identify cost-effective solutions and improvements, and eventually assist in the implementation of some of those solutions.

Initial assessments of these four facilities were conducted in late 2010 and early 2010. These assessments looked at each facility's water management systems, identifying which processes used the most water, where significant leaks or wasteful use is occurring, and significant sources of pollution. They indicated several shared problems and challenges including:

- Each facility has insufficient water management systems.
- Each facility has no or insufficient hot water returning system to boiler from their workshop, leading to energy and water loss of boiling.
- Each facility has significant leaks in its water distribution system.
- Each facility has significant water inefficiencies in its sanitation systems.
- Workers at each facility know little about water efficiency techniques, resulting in widespread wasteful behaviour.
- None of the factories has experts or specialists in water management to help promote good practice in this area. At times, this has led to the improper or ineffective implementation of practice and technologies.
- In larger facilities, the sharing of information across departments is lacking, leading to excessive application of chemicals (and therefore unnecessary pollution) and wasteful water use.

Subsequent visits were spent identifying and attempting to implement low-cost solutions depending on the specific circumstances and needs of each facility.

Hansae company (H&M)

Hansae Company is a garment manufacturer located in the Cuchi District of Ho Chi Minh City. Hansae supplies products to H&M and other international brands. Hansae's 8,630 employees produce roughly 30 million pieces a year. According to VNCPC's assessment, Hansae uses 2,165 cubic meters (m^3) of water per day, about 2/3 of which is lost in the sanitary system due to broken valves and a failure to turn off the tap during working hours.

Table 1: Estimate of Hansae's Daily Water Consumption

Process	Water consumption (m3/day)	Percent of total	Notes
Boiler	200	9%	Returning >80%
Sanitary	1437	66%	Actual recorded amount
Roof cooling	175	8%	
Tree watering	100	5%	
Canteen	138	6%	
Expert area	25	1%	
Loss	90	4%	
Total	**2165**	**--**	

VNCPC recommended the following solutions, which it estimated could save more than $100,000USD per year if implemented:

- Equip water meters at every sanitary section for consumption quantity monitoring and leaking detection,
- Replace broken taps,
- Educate the worker for better water consumption behaviour,
- Insulate the condensed water tank to save energy for boiling.

Installed automatic taps in restrooms

Though Hansae declined to implement the condensed water tank, VNCPC did proceed with applying automatic taps, timers, and improved water monitoring. These improvements resulted in a decrease of 16,000 m^3 of water per month, equal to $75,000USD per year.

<u>Formosa Taffeta (Nike)</u>

VNCPC also assessed Forma Taffeta, a supplier of Nike specializing in fabric knitting, dyeing, and washing, and located in the Ben Luc District outside of Ho Chi Minh City. Formosa Taffeta employs roughly 800 people and produces over 40 million yards of product per year. According to VNCPC's assessment, Formosa Taffeta uses 6,789 $m^3$of water per day, 40% of which was attributed to unnecessary losses due to leaks in the piping system and worker behavior.

Condensed water recycling system

Table 2: Estimate of Formosa Taffeta's Daily Water Consumption

Process	Water consumption (m3/day)	Percent of total	Notes
Boiler	200	3%	Returning 26%
Knitting	1947	29%	
Dyeing	1708	25%	
Sanitary + canteen	56	<1%	Literature benchmark
Tree watering	105	2%	Literature benchmark
Other purpose	55	<1%	
Loss	2718	40%	
Total	**6789**	**--**	

VNCPC recommended the following solutions, which they estimated could save more than $1,000,000USD per year if implemented:

- All of condensed water should be returned to the boiler for water and energy savings. If the returning rate rises from 26% to 70% (the common rate in Vietnamese factory), costs saving would be roughly $880,000USD/year.
- Water meters should be installed at all sections at the input and output points.
- The pipe system needs to be fixed and monitored to avoid steam and heat loss during distribution.
- Steam-trap management and maintenance or replace with a steam-guard.
- Reusing post-treatment water for certain processes, such as watering, toilet or cleaning purposes.
- Increased information sharing between the different departments of the facility.

Thus far, Formosa Taffeta has installed the condensed water returning system and additional water meters throughout the facility. However, data from April 2012 showed that the solutions have had little effect on manufacturing costs due to improper installation and worker inexperience operating the new systems. Further measurement is needed to ensure that the intended improvements are reached.

Lucretia (Levi)

Lucretia is a supplier of Levi, located in Binh Duong Province near Ho Chi Minh City, specializing in garment dyeing and washing. Lucretia employs 313 workers and produces over 3.5 million pieces per year. VNCPC estimates that Lucretia uses 666 m^3 of water every day, 60% is attributed to main washing and dyeing. VNCPC identified leaking pipes and a lack of communications among sections of the factory that leads to inappropriate volumes of chemicals as significant issues at the facility.

Table 3: Estimate of Lucretia's Daily Water Consumption

Process	Water consumption (m3/day)	Percent of total	Notes
Boiler	45	7%	Returning 30%
Boiler emission treatment	64	10%	
Backward cleaning system	67	10%	
Main washing and dyeing	400	60%	
Sample washing and dyeing	23	3%	
Colour spraying	5	<1%	

Process	Water consumption (m3/day)	Percent of total	Notes
Sanitary	15	2%	Literature benchmark
Tree watering	2	<1%	Literature benchmark
Expert area	5	<1%	Literature benchmark
Loss	40	6%	
Total	**666**	--	

VNCPC suggested the company implement some option to improve water use efficiency:

- The returning condensed water system must be checked and insulated throughout the whole system. In addition, the steam supply system needs to be fixed and reinsulated to avoid the steam and heat loss during distribution.
- Steam-trap checked and better maintained or replaced with a steam-guard, which is more durable.
- Water meters should be installed in all departments at the input and output points to monitor water use.
- Reusing post- treatment water for boiler emission system cleaning and toilets to save 64m^3 per day.
- Encourage more information sharing across departments of the facility to use the chemical and equipment properly.

Open and no-insulation tank of condensed water

At the time of this report, Lucretia has implemented several of these solutions, including repairs to the steam and water supply system (resulting in a savings of 40 m^3 of water per day) and water meters, with plans to re-insulate the steam system.

Newell Nhabe (H&M)

Newell is a facility specializing in garment finishing with 450 workers located in District 7 of Ho Chi Minh City. Newell produces roughly one million pieces per year using an estimated 1428 m^3 of water per month, according to VNCPC.

Table 4: Estimate of Newell Nhabe's Daily Water Consumption

Process	Water consumption (m3/month)	Percent of total
Boiler	135	9%
Washing	650	46%
Air cooling system	162	11%
Sanitary	481	34%
Total	**1428**	--

Initial analysis indicated that Newel is already taking several measures to curb water use, including installed water meters and a water consumption policy. However, it also identified mold growing in the water pad in the air cooling system, blocking water transfer and potentially posing a health threat to workers. VNCPC suggested the company implement some options to improve water use efficiency:

- Fix the steam leaking in the washing machine.
- Condensed water recycling system should be established as soon as possible to save the cost on fuel.
- Fix all the leaking in the air-cooling system. The air-cooling system should be cleaned and maintained frequently for effective using, avoid the blocking of heat transfer.

Mold growing in the air cooling system

Since October 2011, Newell has fixed all leaks in the water and steam supply system and upgraded the toilet systems, but has declined to implement a condensed water returning systems for the time being, due to the financial crisis in Vietnam.

Conclusion

SEAAWA's training workshops and technical assistance phases revealed several realities about industrial water management in the apparel industry in Southeast Asia. Above all else perhaps is the fact that sustainable water management is a new concept for many, if not most, facilities in the region. Though this means that wasteful water use and unnecessary pollution is prevalent, it also means that there is a wide range of low-cost, "low hanging fruit" options that could result in immediate water and cost savings. What is needed most is continued awareness building of water management as a critical issue and ongoing encouragement and facilitation of good practices from international brands and international initiatives. This increased awareness could be gained by more frequent and wider ranging training workshops, both prior to and following technical assistance.

As for the implementation of the project and other similar projects in the future, facilities could benefit from more active and direct engagement from the Mandate Secretariat, UNEP, and participating brands to ensure continuous progress. More time is also needed to allow for implementation of new practices and technologies, and to collect data on the effects of those practices. Active encouragement and engagement from participating brands may also be a critical factor in motivating the uptake of suggestions and recommendations among suppliers as implementing partners and consultants only have limited influence on supplier decision-making.

Appendix A: Compilation of Good Practices for Sustainable Water Management in Apparel Manufacturing

As part of this project, the Mandate Secretariat compiled good practices relevant to water management in apparel manufacturing that informed the training workshops and technical assistance aspects of this work. This compilation of good practices is based on available research and guidance on this topic and insight and experience from participating brands. Research and guidance that informed this table includes:

- Business for Social Responsibility's (BSR) Water Management in China's Apparel and Textile Factories
- H&M's Low Hanging Fruit: Manual for Performance Improvement Options
- LeviStrauss and Co. Social and Environmental Sustainability Guidebook
- Natural Resource Defense Council's (NRDC) Ten Best Practices for Textile Mills to Save Money and Reduce Pollution

Practice	Description	Link	Phase	Effects / Savings	Cost / Benefit Analysis	Payback	Applicability
	What happens in this process?		What stage of textile manufacturing does this practice occur at (e.g., pretreatment, dyeing, printing, finishing, etc.)?	How does this practice affect water use and/or wastewater quality? (Specify whether savings are for water withdrawal or consumption, or whether they refer to impacts.)	How much money is required upfront? How much money is required to implement this practice on a daily basis?	How long does it take to recoup costs?	What size/types of facilities can implement this practice? What processes are required?
Internal governance / Training							
Involving workers	Raising workers awareness through training in each department what they can do, inform about incentives, have information posters visible in appropriate localities in factory to remind all staff of their responsibility	--	All	Not quantifiable	N/A	N/A	All facilities
Setting up an efficiency improvement team	Efficient improvement teams compile the required information for improvements, to set up ideas and implement cleaner production measures, to monitor and benchmark their success and to keep employees informed by internal communication. If there is something to replace, to reorganize or to purchase, the team can facilitate the decision-making process.	--	All	Not quantifiable	N/A	N/A	All facilities

Practice	Description	Link	Phase	Effects / Savings	Cost / Benefit Analysis	Payback	Applicability
Industrial wastewater emergency plan	Develop an industrial wastewater emergency plan to be used in case the factory's wastewater treatment process breaks down or the local wastewater treatment facility (POTW) breaks down.	Link	Apparel manufacture, Fabric mills	Wastewater quality	N/A	N/A	All facilities
Measuring / Monitoring							
5S system	Management concept for housekeeping and efficiency	Link	All	Routines to ensure water is not unnecessarily wasted in workshops can be incorporated in a 5S approach.	Not quantified	Not quantified	All facilities
Sub-metering	Meters can be installed to better measure water requirements for various processes. This can help initiate efficiency improvements, identify leaks, detect spikes in water use, track relative water reuse of specific processes, and to quantify impact of efficiency measures.	--	All	N/A	$1000/meter	--	All facilities
Steam meters	Meters can also be installed to better measure the water intensity/losses of steam processes.	--	All	N/A	$3000/meter	--	All facilities
Measurement software	Measurement software allows for more efficient and systematized measurement and analysis. Data can be sent to other locations electronically	--	All	N/A	$15,000	--	All facilities
Laboratory analysis of influent and effluent	Conduct laboratory analysis of effluent industrial wastewater to demonstrate that it complies with applicable governing agency requirements and buyer's Global Effluent Requirements limits, whichever are stricter.	Link	Apparel manufacture, fabric mills	Wastewater quality	Difficult to quantify	--	All facilities
Measure water flow	Measure incoming volume of fresh water supplied to the factory from all sources and volume of effluent (outgoing) wastewater, using a flow meter. Keep a daily log of flow meter readings of incoming water and outgoing wastewater.	Link	Apparel manufacture, Fabric mills	Water quantity	Difficult to quantify	--	All facilities

Practice	Description	Link	Phase	Effects / Savings	Cost / Benefit Analysis	Payback	Applicability
Develop and maintain facility-wide flow diagram	Document water (and steam) flow throughout the facility, including all influent, effluent, water meters, departments, water-intensive processes, wastewater treatment, etc.	Link	All water-intensive processing	Enables leak detection; continuous improvement to reduce water use	Difficult to quantify	--	All facilities
Periodically perform facility-wide water balance, locate and repair leaks	Use flow diagram and meter readings to identify losses and opportunities for improvement	--	All water-intensive processing	Enables leak detection; continuous improvement to reduce water use	Difficult to quantify	--	All facilities
Maintenance / Improved housekeeping							
Leak detection	Routinely investigating source of leaks in water and steam	Link	All	1-5% of facility water use	$0	N/A	All facilities
Preventative maintenance	Routinely monitor and repair equipment before leaks occur	Link	All	1-5% of facility water use	Minimal	N/A	All facilities
Recycling / Reuse							
Reuse of non-contact cooling water	Non-contact cooling water can be recaptured and reused for desizing, scouring, washing, and rinsing. Requires installation of water reuse systems.	Link	Preparation	Ranges from 1-5% depending on process	$1,500	Less than one month	Many, esp. singeing, preshrink machines, air compressor systems
Reuse of steam condensate	Condensate produced in the dyeing process can be reused, esp. by boiler operations. Can also be used for washing or desizing.	Link	Dyeing	~2.5% of facility water use	Ranges widely	Between 1-8 months	Woven fabric mills and knitted mills
Optimization							
Cold pad batch processing	Alkali/hydrogen peroxide or dyes are embedded into the fabric using a padder; fabric is then stored to allow complete reaction prior to rinse.	Link	Preparation; Dyeing	~50% water and energy use; ~38% steam	$37,500, requires longer processing time and storage space for batches in process	Four months	Woven cotton fabric; best for heavy-weight fabric and dark colors
Dyehouse automation	Automates processes (including automatic dispensing, dissolving/mixing, transportation and distribution of liquid and solid dyes and chemicals, etc.) in order to maximize process efficiency	--	All	Not offered	Not offered	~1-3 years	All dyehouses
Treatment							
Secondary wastewater treatment (at least)	Implement aerobic and/or anaerobic biological treatment to reduce eutrophication potential and aquatic toxicity	--	Wastewater treatment	Reduced pollution (not quantified)	Varies widely depending on quality of effluent	--	All facilities