Chapter 5

SCP in Bangladesh: The Brown Hope of Hazaribagh and the Golden Fibre of Bangladesh

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5.1 Introduction

Bangladesh is a low-lying, riverine country located in south Asia with a largely marshy jungle coastline of 580 km on the northern littoral of the Bay of Bengal, formed by a delta plain at the confluence of the Ganges and Brahmaputra rivers and their tributaries. The total land area of 147,570 km^2 consists mostly of floodplains (almost 80%) leaving the major part of the country, with the exception of the North-western highlands, prone to flooding during the rainy season [Denissen, 2012]. Bangladesh's alluvial soil is highly fertile, but vulnerable to flood and drought. Hills rise above the plain only in the Chittagong region in the far Southeast and the Sylhet division in the Northeast. Straddling the Tropic of Cancer, Bangladesh has a tropical monsoon climate characterised by heavy seasonal rainfall, high temperatures, and high humidity.

Bangladeshi geography is varied and is characterised by two distinctive features: a broad deltaic plain subject to frequent flooding, and a

small hilly region crossed by swiftly flowing rivers. Bangladesh is bordered on the West, North, and East by a 4,095 km land frontier with India and, in the Southeast, by a short land and water frontier (193 km) with Myanmar. On the South is a highly irregular deltaic coastline of about 580 km, fissured by many rivers and streams flowing into the Bay of Bengal. The territorial waters of Bangladesh extend 22 km, and the exclusive economic zone of the country is 370 km. As a low-lying country, it is vulnerable to flooding and cyclones and stands to be very badly affected by any rises in sea levels, storm surges, and salinity intrusion resulting from climate change [Mahmood, 2012].

Urbanisation in Bangladesh is proceeding rapidly. Cities in Bangladesh are already faced with the challenges of rapid population increase characterised by crises such as lack of economic dynamism, governance failures, severe infrastructure and service deficiencies, inadequate land administration, massive slums, and social breakdown [Hussain, 2013]. The areas around Dhaka and Comilla are the most densely settled. About 9% of the Bangladeshi population lives in the Dhaka metropolitan area, which contributes to 36% of the country's Gross Domestic Product (GDP). An additional 11% of the Bangladeshi GDP is generated by Chittagong, the second-largest city and home to 3% of the population [Hussain, 2013].

5.2 Industrial Pollution, Environmental Policies and SCP

The main thrust of industrialisation of Bangladesh began in 1971 following the country's independence, when a number of industrial plants were established in different areas of the country. Environmental issues were not considered seriously at that time, resulting in the present environmental condition of severe degradation [Hoque and Clark, 2013]. Urban centres like Dhaka City and Chittagong are major industrial hubs suffering from serious environmental pollution, which is creating major challenges to the city administrations. Environmental problems occur mainly due to population growth, urbanisation, industrialisation, rapid rise in transportation, inadequate and improper traffic management, poor sanitation systems, and inefficient solid waste management (SWM). Severe air, water, and noise pollution are threatening human health, ecosystems, and economic

growth. Environmental degradation is also caused by poverty, overpopulation, and lack of awareness on the subject. It is manifested by deforestation, destruction of wetlands, soil erosion, and natural calamities.

The main industrial areas of Bangladesh are in Dhaka, Chittagong, Khulna, and Bogra districts and the most contributing industries for water pollution are pulp and paper, pharmaceuticals, metal processing, food industry, fertiliser, pesticides, dyeing and painting, textiles, and tannery. More than 200 rivers directly or indirectly receive a large quantity of untreated industrial waste and effluent. The Department of Environment (DOE) has listed 1,176 factories that cause pollution throughout the country, many of them tanneries located in Dhaka [Alam, 2009]. Furthermore, the indiscriminate discharge of solid waste and domestic and hospital sewage is the major source of water pollution. This solid waste is associated with problems of littering on roads, spilling around bins, clogging of drains, and indiscriminate dumping on vacant plots and causes serious environmental pollution impacting public health.

In order to promote environmental consciousness and halt further ecological degradation, the National Environment Policy was issued in 1992 as a guide to long-term sustainable and environment friendly development and outlined the following objectives:

1. Preservation and improvement of the ecological balance;
2. Identifying and controlling all environment polluting and degrading activities;
3. Minimising the impact of natural disasters on the environment;
4. Ensuring environment friendly development in all sectors;
5. Ensuring long-term sustainable/environmentally sound utilisation of natural resources; and
6. Active promotion and participation in all international initiatives for the improvement of the global/regional environment [The Fourth Five Year Plan, 1990–1995].

In 1995, the National Environment Management Action Plan (NEMAP) was issued, focusing on additional environmental issues in Bangladesh. The NEMAP proposes actions to align with the international sustainable development agenda that resulted from the Rio Summit in

1992, created by the Ministry of Environment and Forest (MOEF). NEMAP puts particular emphasis on the participation of people in its implementation and monitoring. The objectives were to identify the key environmental issues of Bangladesh, and the actions required to halt or reduce the rate of environmental degradation. The increase in industrial activities, such as textiles and tanneries, and the establishment of new industries, such as electronic component manufacture, are regarded as key issues [Ministry of Environment and Forest, 1995].

Furthermore, the Bangladesh Environmental Conservation Act (BECA) was passed in 1995, and with the accompanying 1997 Rules, are arguably the most important legislative documents for industrial water pollution. The Act is dedicated to the "conservation, improvement of quality standards, and control through mitigation of pollution of the environment" [Bangladesh Environmental Conservation Act, 1995]. The 1997 Environment Conservation Rules, made in accordance with the 1995 Act, provide additional guidance for specific components of the Act.

Industrial pollution has since worsened and become a major area of public policy concern in Bangladesh. Despite the NEMAP and the Environmental Conservation Act, controlling the quantity of industrial effluents and waste discharges that have adverse environmental impacts, especially regarding water pollution has proved difficult. According to Aminuzzaman [2010], Bangladesh's environmental policy can still be considered to be a good foundation to bring about necessary changes to address and mitigate the major challenges of pollution. What is required is a broad-based consensus among various stakeholders as well as the political will to implement the existing policies. Furthermore, modifications to existing frameworks are necessary, not only to reflect the latest international developments resulting from the Sustainable Development Goals (SDGs), but also to take a new and more sustainable path instead of pursuing business as usual. Embracing sustainable consumption and production (SCP) as a guiding principle could significantly contribute to a more environmentally friendly and healthy society and contribute to the country's economic growth and development.

It is therefore imperative to switch to SCP, to make the necessary changes to social, economic, and environmental systems and approaches in order to overcome the crises that Bangladesh now faces, which are

mounting. To achieve this, a collective conscious decision to develop a sustainability transition approach is crucial. An example of such collective action is the *Blueprint for European SCP* [EEB, 2009], which was produced through collaboration between environmental and social non-governmental organisations (NGOs) and the research community. In sustainable production, Bangladesh needs to identify priority areas and objectives, beyond climate change and energy, while at the same time it needs to prioritise sustainable consumption for the country's development. This is not an easy task, but essential. For European companies and consumers, the transition to SCP patterns must mean more than just enabling consumers to buy products that are a little bit greener, but to take more active responsibility for the way products are produced in Bangladesh and other developing countries.

5.3 The Role of SMEs in Bangladesh's Economy

Bangladesh, as a growing exporter of primary goods, has been included as one of the "Next Eleven" of developing countries with the potential for serious foreign-investment-led growth [Eghbal, 2008]. Between 2004 and 2014, Bangladesh averaged a GDP growth rate of 6% and, according to a recent poll, Bangladesh has the second most pro-capitalist population in the developing world with 80% of the population supporting free market development [Dhaka Tribune, 2014]. The economy is increasingly led by export-oriented industrialisation.

For the Bangladeshi economy, the textile industry plays a vital role, being the second largest in the world. Other key sectors include pharmaceuticals, shipbuilding, ceramics, leather goods, and electronics. Being located in one of the most fertile regions on Earth, agriculture plays a crucial role, with the principal cash crops including rice, jute, tea, wheat, cotton, and sugar cane. The Bangladeshi telecoms industry has witnessed rapid growth over the years and is dominated by foreign investors. The government has emphasised the development of software services and hi-tech industries under the Digital Bangladesh scheme.

Bangladesh has substantial reserves of natural gas and coal; many international oil companies are involved in production and exploration activities in the Bay of Bengal. Regional neighbours are keen to use

Bangladeshi ports and railways for trans-shipment. Located at the crossroads of SAARC, the ASEAN+3, BIMSTEC, and the Indian Ocean, Bangladesh has the potential to emerge as a regional economic and logistics hub [Chowdhury, 2013; Rahmatullah, 2013].

In 2015, Bangladesh's per-capita annual income stood at EUR 1,185 [The Daily Star, 2015]. Accelerating growth and reducing poverty, and reducing income inequality and regional disparity continue to be the overarching goals of the current development paradigm in Bangladesh. The main strategy for achieving these goals include the creation of productive employment in the manufacturing and organised service sector, and the withdrawal of the labour force from the low-skilled and low-return agricultural sector and informal activities. The development of small- and medium-sized enterprises (SMEs) is envisaged as a key element in this development strategy [Bakht and Bashar, 2015]. According to Abdin [2012], there are about 6 million SMEs in the country constituting about 90% of all industrial units, which generate about 25% of the national GDP. SMEs employ about 31 million people and provide 75% of household income. Various categories of SMEs together contribute between 80 and 85% of industrial employment and 23% of total civilian employment in Bangladesh. The most promising SME industries and sectors are electronics, light engineering, plastic goods, leather goods and footwear, agro-processing, fashion design, knitwear and ready-made garments, pharmaceuticals, jute and jute goods, handicrafts, frozen fish, ceramics, and furniture. For the first time in 2010, the country's National Industrial Policy defined SMEs uniformly with numbers of employment and replacement cost indicators (see Table 5.1).

Table 5.1: Bangladesh SME definition [Abdin, 2012]

Category	Small	Medium	Indicators
Manufacturing	50–100 million	100–300 million	Replacement cost (in BDT)
	25–99	100–250	No. of workers
Service	5–10 million	10–150 million	Replacement cost
	10–25	50–100	No. of workers

According to the survey of manufacturing industries carried out by the Bangladesh Bureau of Statistics [cf. Bakht and Bashar, 2015], the manufacturing sector of Bangladesh with 10 or more workers had the following size distribution in 2010–2011 (see Table 5.2).

The survey results show that SMEs are an important element of economic growth and, considering the population of Bangladesh, SMEs offer large-scale employment and income-earning opportunities at relatively low costs, especially in the rural areas. Prime Minister Sheikh Hasina, who took pragmatic measures to boost SME development, has recognised the significance of the SMEs as source of new business creation and employment generation. The government's three-pronged programme has supported SMEs' technological innovation, provided banking support and market coordination, and thereby created new opportunities for SMEs to grow [Afzal, 2011] .

The EU-funded SWITCH-Asia Programme also recognises the roles of SMEs especially in establishing SCP patterns in Bangladesh. By equipping SMEs with new skills through capacity building, the SWITCH-Asia projects not only support them to grow economically, but also sustainably (see Table 5.3 for a list of SWITCH-Asia projects implemented in Bangladesh).

5.4 Bangladesh's Leather and Tanning Industry

The tanning industry is an old manufacturing sub-sector in Bangladesh with a long heritage of over six decades. There are at present about 240 tanneries operating in the country, 200 of them are concentrated in Dhaka. From the very beginning of industrialisation in Bangladesh, tanning industries have been playing a significant role in the country's economy. In international markets, its leather products have been earning Bangladesh significant amounts of foreign currency. Also domestically, it is lucrative business and the leather industry has a significant contribution on the economy and GDP. Due to the relatively inexpensive cost of labour and materials, over half the world's tanning activity now occurs in low and middle-income countries (MICS) including Bangladesh. Between 1970 and 1995, the percentage of low to MICS contributing to the global production of light leather increased from 35 to 56% and from 26 to 56%

Table 5.2: Size distribution of manufacturing establishments with 10 or more workers, 2010–2011

Description	Micro (10–24 Workers)	Small (25–99 Workers)	Medium (100–249 Workers)	Large (250 or More Workers)	Total
No. of establishments	17,384 (40.6)	15,666 (36.6)	6,105 (14.3)	3,639 (8.5)	42,792 (100)
Total persons engaged	271,644 (5.4)	738,801 (14.7)	1,041,220 (20.8)	2,964,272 (59.1)	5,015,936 (100)
Gross value added (million BDT)	92,092 (5.9)	369,974 (23.7)	363,646 (23.3)	737,235 (47.2)	1,562,947 (100)
Value added per worker (thousand BDT)	339	501	349	249	312

Source: Bangladesh Bureau of Statistics [cf. Bakht and Bashar, 2015].

Table 5.3: List of SWITCH-Asia projects implemented in Bangladesh

Name of Project	Period	Main Implementing Organisation	Places of Implementation	SCP Practice	Brief Description of Objectives or Impact
Re-Tie Bangladesh	2009–2012	sequa GmbH, Germany	Bangladesh	Cleaner production	To support leather SMEs to work more economically and ecologically and to be more sutainable with the use of aligned technologies and practices
Eco-Jute	2010–2014	Traidcraft Exchange, UK	Bangladesh, India	Sustainable value chain	To promote economic prosperity and reduce poverty in Bangladesh and India by encouraging a switch to more environmentally sustainable practices in the jute industry; and promote SCP of eco-friendly jute diversified products (JDPs) in Bangladesh and West Bengal, India
Jute diversified products	2013–2016	CARE, France	Bangladesh	Sustainable value chain	To contribute to pro-poor economic growth through social business promotion with an emphasis on sustainable agriculture sector growth and poverty reduction in Bangladesh; and to strengthen the export competitiveness of Bangladesh through promotion of environment friendly jute diversified products

(*Continued*)

Table 5.3: (*Continued*)

Name of Project	Period	Main Implementing Organisation	Places of Implementation	SCP Practice	Brief Description of Objectives or Impact
ECOLEBAN	2014–2018	Fundación Tecnalia Research and Innovation, Spain	Bangladesh	Resource efficiency, eco-labelling	To promote resource efficiency and sustainability of the leather sector in Bangladesh throughout the whole value chain of the leather related products such as footwear and other leather goods
Tomato and mango value chain (TMVC)	2016–2019	SNV the Netherlands	Bangladesh	Sustainable consumption, inclusive business	To contribute to greater consumer confidence in domestically produced processed horticultural products, reduced food safety incidences in the domestically processed horticultural products, inclusive business development in the fruit and vegetable processing industry
METABUILD	2016–2020	The Energy and Resources Institute (TERI), India	Bangladesh, Nepal, Sri Lanka	Resource efficiency and cleaner production (RECP)	To implement sustainable production processes and practices in 400 SMEs and to create a conducive environment for further adoption of sustainable production processes in the metal products supply chain for the building and construction sector
Bangladesh Sustainable Building	2016–2020	Oxfam, UK	Bangladesh	Sustainable building	To contribute to a reduction in GHG emissions, deforestation and land degradation in Bangladesh; and promote sustainable and eco-friendly building materials and practices within an enabling policy environment

for the production of heavy leather materials [Jenkins, Barton, and Hesselberg, 2004].

The Government of Bangladesh has identified the leather sector as one with considerable growth and investment potential, ranking fifth in the export sector. Currently, Bangladesh produces and exports quality bovine and ovine, caprine (buffalo and cow, sheep and goat) leathers that have a good international reputation for fine textured skins. Tanneries in Bangladesh produce more than 16 million m^2 of hides and skins per year. In addition, there are about 30 modern shoe manufacturing plants engaged in the production of high-quality footwear, with over 2,500 smaller footwear manufacturers. The sector employs approximately 558,000 people directly.

Bangladesh's leather sector is deemed competitive because of its low labour cost differentiation, local availability of hides and a favourable business environment. This is complemented by the existence of organisations and institutional arrangements like the Export Processing Zone (EPZ) and duty free access to major international markets. Leather manufactured from these places is shipped to the US, Europe, and other parts of the world for further processing. According to the footwear sub-sector of Bangladesh in 2010–2011 earned revenues in excess of USD 250 million. The European Union (EU) is the biggest destination for footwear exports with a 60% share, followed by Japan with 30%, and the rest of the world accounting for 10%. The BECA of 1995, and the accompanying 1997 Rules, contain specifications of waste discharge quality standards for all industrial units [Clemett, 2004], including the leather and tannery sector (see Table 5.4).

Among all industrial wastes, tannery effluents are ranked among the pollutants with the highest toxicity and impact on environment and human health [Shen, 1999]. According to a study conducted by Blacksmith Institute [2010], roughly 75% of chromium-polluted sites are located in South Asia and of these, nearly a third are associated with tannery operations, with mining, and metallurgy sites also contributing significantly. The high concentration of chromium sites in South Asia is primarily due to the abundance of tanneries in the region, including in Bangladesh. As many of the tanneries have very poor environmental controls and very few factories provide treatment facilities [Blacksmith Institute, 2010], the tanning industry is known to cause horrendous environmental pollution.

Table 5.4: Emission standards for tanneries according to the BECA and Rules [Clemett, 2004]

Parameter	Limit
Total suspended solids	150 mg/L
BOD5 20°C	100 mg/L
Sulphide as S molecule	1 mg/L
Total chromium as Cr molecule	2 mg/L
Oil and grease	10 mg/L
Total soluble solids	2,100 mg/L
Wastewater flow	30 m^3/tonne processed leather
pH	6.5 to 9

The high environmental impact of tannery effluents makes its treatment an essential fact, mainly due to its volume, nature, and the concentration of pollutants such as tanning agents (chromium and tannin), colour, organic matter, and others. It has been reported by UNIDO that only about 20% of the large number of chemicals used in the tanning process is absorbed by leather, the rest is released as waste [UNIDO, 2005]. Furthermore, discharged chemicals from the larger factories are often being re-used by the small factories, a practice unsafe for both the environment and tannery workers. Furthermore, tanneries produce other waste and by-products. To make value added products, a by-product manufacturing unit (chrome and protein recovery), and energy generation could be useful options. The industry in Bangladesh as a whole faces considerable concerns with regard to end-of-life, recycling, and reuse of leather and leather products.

Around 40 heavy metals and acids are used for processing raw hides [UNIDO, 2005] including chromium, a heavy metal that can exist in air, water, soil, and food. Common exposure pathways of chromium include ingestion, inhalation, and dermal contact. The primary health impacts from chromium, which is known to be carcinogenic, are damaging to the gastrointestinal, respiratory, and immunological systems, as well as reproductive and developmental problems. In addition, the chromium-laced solid waste from tanneries is often converted into poultry feed as is the case in areas of Bangladesh, which can further impact livestock and humans [Hossain, 2007]. Very few export-oriented factories use safety

equipment to protect their workers, where others do not pay attention to their worker's health and safety. Jaundice, nausea, and headaches are workers' common sickness. According to the World Health Organisation (WHO), over 8,000 workers in tanneries have gastrointestinal, dermatological, and other diseases, and 90% of this population will die before the age of 50 [Maurice, 2001]. With the current trend of more focus towards ethical manufacturing processes, many countries and consumers are concerned about the way in which their products are being manufactured. The European Commission has considered an import ban on leather or leather goods to European countries from Bangladesh for several years, in particular concerning tanneries in the area of Hazaribagh, due to its unsafe manufacturing processes [Tremblay, 2009]. Therefore, there is strong pressure on the industry to lower the pollution level to protect the environment and natural resources. This will require SCP practices and improvements in the tanneries' daily operations. A case study from the EU-funded SWITCH-Asia project, introducing sustainable production to the leather industry in Bangladesh, is described in Box 5.1.

Box 5.1 SWITCH-Asia case study: Reduction of environmental threats and increase the exportability of Bangladeshi leather products (Re-Tie)

The SWITCH-Asia "Re-Tie Bangladesh" project worked with SME tanneries in Bangladesh, including Hazaribagh, to address the issues of water pollution and threats to environment and human health. The project was implemented from February 2009 until November 2012, by a consortium consisting of sequa (Germany), the United Nations Industrial Development Organisation (UNIDO), the Training and Development Centers of the Bavarian Employers' Associations (bfz) (Germany), the Dhaka Chamber of Commerce and Industry, and the Bangladesh Finished Leather, Leather goods, and Footwear Exporter's Association.

The approach of the project was to provide incentives for SMEs to adopt cleaner production practices, which are tantamount to increased exportability of products, due not only to cost reductions but eventually as a consequence of institutionalised sustainable production and compliance with international

(*Continued*)

Box 5.1 (*Continued*)

environmental standards. The activities of the project included more than 30 training sessions, workshops, and conferences, attended by more than 1,000 participants, on the efficient use of resources and significant reduction of pollution/waste. Furthermore, exportability through improved occupational health and safety (OHS), corporate social responsibility (CSR), and other international standards were part of the training. In addition, 15 national experts on cleaner production in the areas of water, energy, chemicals, and OHS were trained to continue with further training after the project completion.

Twelve pilot tanneries participated directly and more than 50 were frequently involved. With project intervention in the participating companies, the level of chemical and biological oxygen demand (COD/BOD) could be reduced by 30%, water consumption by 30–50%, and chrome content by 60%. Application of cleaner production practices were facilitated by the trained local experts and supervised by international experts. The specific measures implemented included: hair-saving unhairing processes, solar water heating, full-scale chrome management, strict water management systems, float recycling, segregation of streams, segregation of solid waste, avoidance and monitoring of banned/hazardous substances, desalting of wet salted hides and skins, non-ammonium salt deliming, low-energy drying, and water-based finishing. Technical assistance was provided to influence the cleaner production-relevant physical infrastructure of the new industrial site for the leather industry in Savar.

Business membership organisations (BMOs) in the Bangladesh leather sector have proven capable to promote SCP matters at both the policy and membership levels. These BMOs played a key role in disseminating information and in consolidating the political dialogue between the private sector and public stakeholders. This approach helped to identify and define the specific needs of the companies and solutions to implement cleaner production practices. The project also involved national and local policy-makers as much as possible and worked directly with government departments relevant to the sector. Its recommendations concerning the physical infrastructure of the new tannery development at Savar, North of Dakar, were acknowledged by the Government of Bangladesh. The Ministry of Industries requested more detailed project recommendations, for example regarding SWM.

More information about the project is available from: http://www.switch-asia.eu/projects/re-tie-bangladesh/.

5.5 Case Study: Hazaribagh Tannery Area — The Brownfield

The tanneries of Hazaribagh started their journey from 1960, first introduced by Punjabi traders from what was then Pakistan. The industries expanded and after the independence of Bangladesh in 1971, when the government took over the tanneries abandoned by the departing non-Bengali entrepreneurs, eventually becoming a 'cash cow' to earn foreign currencies. Hazaribagh is the largest tannery region in Bangladesh, consisting of more than 200 tanneries which dump 22,000 cubic litres of toxic waste each day into Dhaka's main river, including the cancer-causing toxin hexavalent chromium [Walsh, 2013].

The direct discharge of this waste has contaminated the ground and surface water with dangerously high concentrations of chromium, as well as cadmium, arsenic, and lead. The contamination of rivers also allows these pollutants to accumulate in common fish and shellfish species, which are used as local food sources. The dumping of untreated liquid tannery waste from tannery industries at Hazaribagh is the major source of pollution of the Buriganga River for the last 45 years. Statistics available from the DOE reveal that 95% of tannery industries have been built in an unplanned way during the last 50 years without environmental impact assessments in congested areas of Hazaribagh. In addition, the area is inhabited by low and middle income settlers without adequate urban facilities. As a solution to the problem, a tannery estate has been set up in Savar and Keraniganj on 199.40 acres of land to shift the Hazaribagh tanneries. The shift has been planned since 2003, but has been delayed many years due to petitions by industry associations. At the time of writing, a new deadline has been set for June 2016. According to Industries Minister Amir Hossain Amu, the government will shut down the tanneries at Hazaribagh in Dhaka if they are not shifted to the Savar Tannery Estate in time [The Daily Star, 2015].

5.5.1 *The challenge: Redevelopment of Hazaribagh into a livable community*

In 1992, the Environmental Protection Agency (EPA) of United States coined the term "brownfield" to describe an idle or abandoned area which

was previously used for industrial or commercial activities that cause environmental pollution. The Hazaribagh area, near Dhanmondi in the heart of Dhaka, experiences a similar situation and can be categorised as brownfield, property where expansion, redevelopment, or reuse will be complicated due to the presence of potentially harmful substances causing pollution. Covering an area of 25 ha, the Hazaribagh tannery area harbours one of the most toxic tannery industries amid residential quarters in the south region of Dhaka towards Nilambar Shaha Road. Furthermore, the urbanisation pattern in Hazaribagh has evolved organically rather than being imposed, if one compares its growth with adjacent areas (Figure 5.1).

The area comprised of Hazaribagh tanneries and adjacent residential areas totals 3.94 km^2. This parcel of land is connected to other parts of Dhaka through some major arterial roads, and to the west where it is bounded by an embankment built in the late 1980s for flood protection. Dhaka and the area beyond this embankment is a flood plain of the Buriganga River. More than 0.2 million people live adjacent to the tannery complex and 20,000 people have been directly exposed to the tannery-related hazards. Effluents from all factories contain significant amounts of heavy metals, especially chromium (374.19 ppm on average) [Asaduzzaman *et al*., 2014], which poses a health hazard to workers and residents. The residential part of Dhaka consists predominantly of medium-rise buildings with narrow setback spaces in between used for pedestrian movement. The industrial area has covered large chunks of plots where the majority of buildings are temporary structures with very few permanent. Within a mixed use and commercial development, schools, mosques, small and medium trades like fruit shops, barber and tailoring shops, tea stalls on the side of the streets, and *kacha* bazaars are prominent (see Figure 5.2).

The Hazaribagh area has a scarcity of green and open spaces. Most of the open spaces are covered with industrial facilities or have been used as waste dumping grounds. Therefore, most of the open and green spaces will need to undergo site remediation when the relocation or closure of Hazaribagh tanneries is completed. The condition of water bodies (lagoons, ponds, and lakes) in Hazaribagh is critical due to waste streams from tanneries. The North–South canal, which runs parallel to the flood

Figure 5.1: The Hazaribagh tannery area

Source: Author's own work using Google Maps.

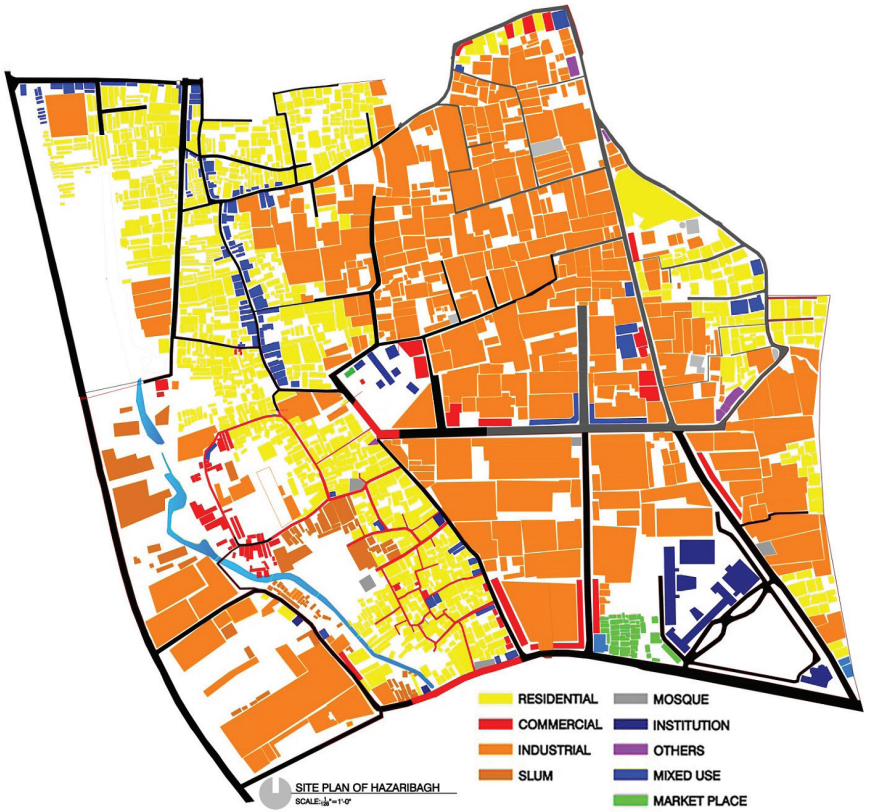

Figure 5.2: Existing land use pattern of the Hazaribagh area

Source: The Capital Development Authority of Bangladesh (RAJUK).

control embankment, is connected to the tannery runoff for ultimate discharge into the Buriganga River. The effluent is temporarily stored in lagoons and later discharged into the Buriganga River via a sluice gate [Bhuiyan *et al*., 2010]. According to Bangladesh's DOE, toxins are also leaching into groundwater. The poisonous chemicals end up forming coloured ponds and lakes in the residential areas harming the people who work and live in the district. Most people suffer from chronic respiratory problems, skin diseases, and even destruction of the nasal septum [Lanteigne, 2010].

Despite the contamination and polluted sites, the Hazaribagh neighbourhoods are characterised by social homogeneity and tightly knit patterns of primary relationships. Thus, the linear *mahalla* (neighbourhood) represents a strong sense of neighbourly relations due to the same occupation, ethnicity, and caste and creates social cohesiveness within the members. It is projected that the total density of the area will increase up to 420 persons per acre in 2015, from 310 persons per acre in 2007. At a glance, the settlement pattern of Hazaribagh may look chaotic and lack order, but behind the chaos exist community structures and a contextual basis of Hazaribagh settlements of old heritage buildings, which characterise a neighbourhood and the social life it contains. Once the tanneries have completely relocated, a new chapter for Hazaribagh can begin.

5.6 Bangladesh's Jute Manufacturing Sector

In contrast to the polluting tannery sector, Bangladesh's jute manufacturing sector is one of the oldest traditional and sustainable manufacturing sectors of the country. The sector has witnessed and experienced fluctuating fortunes. In the 1960s and 1970s, the jute sector was considered the mainstay of the manufacturing industry, because of its significant contribution to the national income, export earnings, and industrial employment. Today, it is a major cash crop for over three million small farm households, the largest industry, producing about one-third of manufacturing output, and the largest agricultural national export commodity. The livelihood of some 25 million people is dependent on jute-related activities in agriculture, domestic marketing, jute production, retting, drying and marketing, manufacturing, and trade [Ullah, 2015].

Jute and allied fibres are the second most important natural fibres next to cotton. The increasing worldwide awareness of sustainability issues has created new opportunities for jute as a renewable resource, due to its environment-friendly characteristics. Jute is a natural fibre that can be used in many different areas, supplementing or replacing synthetics. It is used not only for traditional items, but also for other value-added

products, such as pulp and paper, geo-textiles, composites, and home textiles. Jute is also an annually renewable energy source with a high biomass production per unit land area. It is biodegradable and its products can be easily disposed without causing environmental hazards. Jute plants also play a vital role in increasing the soil fertility.

Bangladesh produces 5.5–6.0 million bales of raw jute every year of which some 3.2 million bales are used in the existing 148 jute mills. The country exports 2.4 million bales of jute and some 1,600,000 employees of the country are directly employed in the jute mills. The total demand for jute goods in the international market is 0.75 million tonnes. Bangladesh exports 0.46 million tonnes of jute goods while India enjoys a share of 0.285 million tonnes in the international market. The capital Dhaka controls about 60% share of the total jute goods market of the world and earns BDT 20.125 billion [Uddin, Hossain, and Hoque, 2014]. From 2003 to 2013, production of jute products including yarn, hessian, sacking, and carpet backing has increased constantly and reached a total of more than 977,000 tonnes in 2013 (see Table 5.5).

Table 5.5: Production of Jute products by type in Bangladesh in 1,000 tonnes

Year	Yarn	Hessian	Sacking	Carpet Backing	Others	Total
2012–2013	618.58	57.59	275.82	10.81	14.51	977.32
2011–2012	537.37	51.07	269.02	16.33	11.47	885.26
2010–2011	451.41	45.24	196.21	16.79	19.43	729.07
2009–2010	425.56	40.86	202.53	15.99	10.22	695.17
2008–2009	330.84	37.83	198.02	13.39	8.76	588.85
2007–2008	372.22	50.80	188.61	21.22	18.20	651.05
2006–2007	341.03	39.58	171.10	18.83	13.08	583.61
2005–2006	298.61	52.84	177.00	23.75	11.23	563.46
2004–2005	201.47	120.24	175.57	18.93	—	521.77
2003–2004	187.8	49.4	145	19.8	—	404.7

Source: International Jute Study Group [2014].

Despite the strong jute production, manufacturing, and export position of Bangladesh, the industry currently faces some serious problems in both public and private sectors, which have converted this industry into an industry with heavy losses and relying heavily on governmental subsidies. Some of these problems include the rise in cost of production, increase in share of unused looms, managerial challenges, lack of effective operating policies, mismanagement in procurement of raw jute, shortage of varied orders received from buyers and obsolete and worn out equipment. The poor financial performance of jute mills also is a major concern. Today the Bangladesh Jute Mills Corporation is the second largest loss maker among public sector manufacturing enterprises, with annual losses of BDT 2.3 billion (about EUR 2.6 million), accounting for over 50% of total manufacturing state-owned enterprise (SOE) losses in financial year (FY) 2006 [Uddin, Hossain, and Hoque, 2014].

An example how the government has dealt with public jute mills running at losses is the closure of the Adamjee Jute Mill, back then the largest jute mill globally, which resulted in the loss of 25,000 permanent jobs and 5,000 temporary jobs [Muhammad, 2002]. It was officially closed down in 2002 despite protests from local policy makers and political opponents, in a move to privatise the jute sector. Closure of public jute mills resulted in the growth of private mills, particularly in northern Bangladesh, a jute growing area, where industrialisation was much needed. Five small mills have been set up in the Greater Rangpur area, but mostly using old machinery from the closed public mills. Investment in these five mills was around BDT 1 billion (EUR 12.7 million) and they provided employment for around 3,000 workers, producing about 40 tonnes of jute bags and fibre daily. Three new mills will be established in the northern districts, which will provide employment for an additional 5,000 people. However, privatisation has not proved to be the solution to alleviate the situation. According to Uddin, Hossain, and Hoque [2014], what is needed to re-establish the jute industry is effort from both employees and the Government to cooperate in the formulation of an effective and well-balanced jute policy, which will bring out operational efficiency.

A case study and lessons learned from the SWITCH-Asia project "Eco-jute" is presented in Box 5.2.

Box 5.2 SWITCH-Asia project case study: Supporting the jute industry in Bangladesh

Under the SWITCH-Asia Programme, two projects were designed and implemented to support the jute sector of Bangladesh and India. The first of the two projects was "Jute: an eco-friendly alternative for a sustainable future." It started its activities in Bangladesh and India's West Bengal area in 2010 and was completed in 2014. It aimed to ensure that there was a positive environmental and economic impact of the jute sector on its workers, producers, farmers, and consumers by encouraging a switch to more environmentally sustainable practice in the jute industry. The project encouraged sustainable production and consumption of eco-friendly JDPs in Bangladesh and India, and focused on increasing awareness of SCP practice. Thirty Bangladeshi and 10 Indian SMEs developed 193 new ranges of JDPs for local consumers, and later 21 Bangladeshi SMEs further developed 51 ranges for institutional buyers. The project thereby improved the capacity of businesses to produce more market-driven products, ensured that service providers had the right set of skills to work with SMEs, established a match making service through Business Facilitation Units to support sustainable service provision, and campaigned for increasing demand for eco-friendly products. The main project activities included building capacity of local service providers, training JDP SMEs to produce market-driven products, while working with consumers to get them to buy more eco-friendly products. The project worked with 181 JDP SMEs and 148 service providers, working both on the supply and demand side. This project benefited at least 500 SMEs, their 25,000 workers and their family members.

The project also encouraged the government to develop relevant jute sector support policies and advocated change on six key issues:

- Ensuring availability of quality jute seeds;
- Expansion of JDPs by ensuring availability of raw materials;
- Ensuring a fair price for jute;
- Commercialisation of innovative products of the Bangladesh Jute Re-search Institute;
- Balancing, modernisation, rehabilitation, and expansion of conventional jute mills; and
- Re-excavation of canals to solve the water crisis for ensuring the quality of jute.

(*Continued*)

Box 5.2 (*Continued*)

More information available at: http://www.switch-asia.eu/projects/jute-an-eco-friendly-alternative-for-a-sustainable-future/.

The second jute project, coordinated by CARE France, is the SWITCH-Asia project "Promoting SCP of Jute Diversified Products." It started in March 2013 with the objective to contribute to pro-poor economic growth through social business promotion, emphasising sustainable agriculture sector growth, and poverty reduction in Bangladesh. The project directly links 16,000 jute producers, 60 organic fertiliser producers, 2,000 jute sector workers, 20 SMEs, three jute mills, and other national associations and public agencies active in the national jute sector. In 2013, the project mobilised 10,000 farmers resulting in 400 producer groups. The following year, another 6,000 farmers joined the cause and formed 240 new groups. Based on this initial success, a database of 16,000 jute producers was compiled covering their livelihoods and other socio-economic aspects. Training on environment friendly jute cultivation, retting, and harvesting techniques were provided. The project has already achieved some significant results. Firstly, it increased the jute cultivation area in the target area: in 2013, producers cultivated jute over 2,034.21 ha of land, while in 2014, 2,111.5 ha, an increase of 77.29 ha. Secondly, it provided farmers with better cultivation practice: for the first time, in 2014, 860 farmers practised line sowing. This new practice reduces seed costs and yields more fibres and jute sticks. Thirdly, the project helped increase productivity: in 2014, the farmers produced 4,000 tonnes of fibres, which is about 797 tonnes more than previous year's production (3,203 tonnes). Fourthly, the project helped reduce agriculture-related CO_2 emissions: in 2014, 2,111.5 ha were used for jute cultivation, which is 77.29 ha more than the previous year. In 2013, 30,513.15 tonnes of CO_2 were absorbed by cultivating jute over 2,034.21 ha of land. In 2014, 31,672.5 tonnes of CO_2 were absorbed, an increase of 1,159.35 tonnes [Ullah, 2015].

More information available at: http://www.switch-asia.eu/projects/jute-diversified-products/.

5.7 Conclusion

The Bangladeshi economy is expanding with 5–6% annual growth during the last decade. The contribution of agriculture to GDP is decreasing, whereas that of industry has been increasing over the last two decades.

Recent statistics show that contribution of agriculture to GDP is much lower at 20% than that of the industry at 30%. The current government has envisioned that the contribution of industry to GDP shall be increased to 40% by 2021. It is clear that the Bangladeshi economy is being transformed from and agriculture to an industry-driven one. Between this amalgamation of agriculture and industry-based economies, both jute and tannery sectors are playing a vital role, while they both are still plagued with various problems and backlogs. In this process, SCP can offer a framework to guide industrial development in a sustainable direction and avoid the past mistakes of the leather and tannery sector. Hazaribagh, Dhaka's notorious tannery area, holds an immense potential in terms of its strategically well-connected location, geographical context and a diversified socio-economic, and cultural context. To be sustainable, the government needs to run the tannery industry properly and needs to act determinedly to facilitate the shift of tanneries towards the newly established designated areas in Savar. At the same time, preparing the Hazaribagh brownfield sites with the knowledge of productive reuse, requires integration of many elements such as financial issues, community involvement, liability considerations, environmental assessment, and clean up and regulatory requirements, as well as coordination among many groups of stakeholders. The SWITCH-Asia project "Reduction of environmental threats and increase of exportability of Bangladeshi leather products (Re-Tie)" has contributed to enhancing the ability of SMEs to implement cleaner production, thereby reducing pollution, and reducing health hazards to workers.

In contrast to the polluting tannery sector, jute has played a key role in the economy of Bangladesh, especially due to a recent renewed global interest in the golden fibres, for instance as replacement of plastic bags. The latest demand for jute creates a strong motivation to support the growth of the jute industry, which will benefit many nations. Whilst the sector suffers from a number of difficulties, the revival of jute sector offers a promising outlook for Bangladesh's sustainable development. Re-establishing the jute industry and enhancing productivity will require a sincere effort from the government as well as the private sector. The framework of SCP might enable us to achieve sustainable growth of the jute industry. Based on the experiences of the SWITCH-Asia projects operating in Bangladesh's jute sector, the country should attempt to expand its share in the global market by supplying more quality goods,

including diversified jute products, which should be further developed, and familiarisation of producers and consumers is required. The application areas of jute need to be enlarged, i.e., jute should be used in new areas like agro-textiles, geo-textiles, technical textiles, as well as home textiles. Furthermore, the "Jute Policy" needs to be reviewed and revised, and in this context, the government's initiative to design a new jute policy is well-timed. The idea of an independent "Jute Board" may be considered in this regard, within which there will be representation of major stakeholders. The government and industry can thus advance and take the necessary steps in this direction, for example highlighting its eco-friendly and biodegradable characteristics. This can achieve the final goal of successful marketing and promotion of jute as a sustainable product for national and global markets.

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