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Cleaner Leather Production



THE CHANGING ENVIRONMENTAL IMAGE OF AFRICAN TANNERIES





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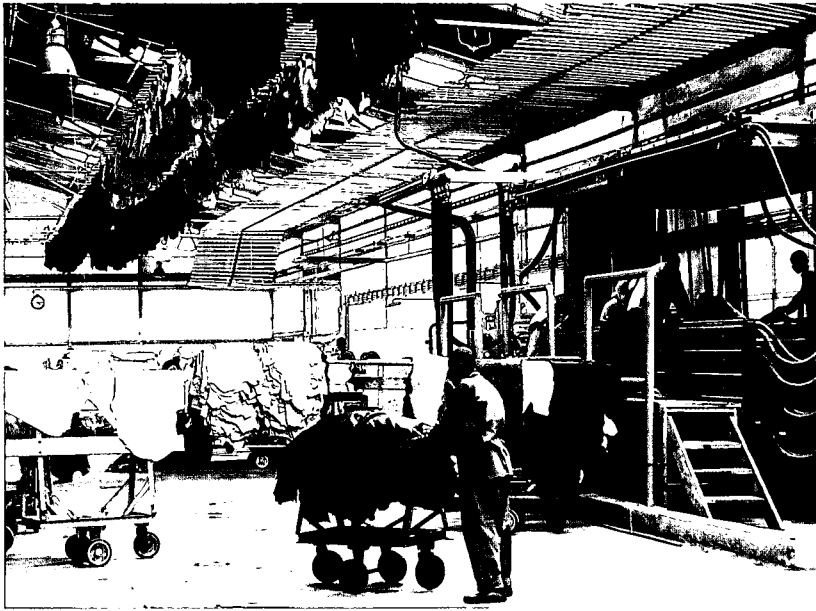
A Regional Campaign to Control Tannery Pollution

Leather making is a source of significant income in most African countries. It is also, both in Africa and elsewhere, a major cause of industrial pollution and has been a prime target of public scrutiny and government regulation. Although African countries have been slow in adopting pollution control standards, environmental regulations, with their punitive impact on company balance sheets, are now either in place or imminent. In Eastern and Southern Africa, where the leather sector is a key area of industrial development, most tanneries have effluent treatment plants and some are experimenting with various means of reducing the volume of solid waste.

A growing number of the region's leading leather manufacturers have come to realize that, while end-of-pipe pollution control systems are necessary, exclusive reliance on such solutions is an expensive option. Fighting pollution at the source, at all stages of production, can yield substantial benefits in addition to considerable reductions in effluent and solid waste volume. Cleaner production (a blend of cleaner technologies and low-cost modifications of conventional production practices) can cut water, energy and chemical consumption. It can also increase productivity and create a more pleasant and less hazardous shop-floor environment. Ultimately, cleaner production can uplift a company's image in the eyes of consumers, neighbours and environmental authorities. With today's increasingly discerning



consumers demanding environmentally friendly products, eco-labelling rights have become an attractive objective for leather producers in countries like Ethiopia, Kenya and Zimbabwe whose leather exports are a success story of industrial development.



Wide-ranging assistance

Over the last three decades, the United Nations Industrial Development Organization (UNIDO) has helped chart the development course of Africa's leather sector. The Organization's Leather Programme in Eastern and Southern Africa is one of its largest and most complex undertakings, with a multitude

of development partners and direct beneficiaries in ten countries. Established by UNIDO in 1995, the Eastern and Southern Africa Leather Industries Association (ESALIA), with headquarters in Nairobi, Kenya, channels assistance and feedback and coordinates all field activities.

Since 1988, some 30 tanneries in Ethiopia, Kenya, Malawi, Namibia, the Sudan, Uganda, the United Republic of Tanzania, Zambia and Zimbabwe have received assistance in pollution control focused on the establishment or upgrading of effluent treatment facilities. Cleaner production options have been discussed in seminars and workshops attended by ESALIA and European experts. More recently, cleaner technologies such as high-exhaustion chrome tanning, hair separation and wet-white processing have been applied in pilot operations. The extensive experience accumulated under the Programme argues strongly for a mix of waste management and cleaner production as the only viable long-term response to the challenge of the adverse environmental effects of tannery operations.

A new momentum

The pursuit of this long-term goal gained new momentum in the late 1990s largely due to the implementation of a sharply focused regional project. Financed through a special-purpose contribution from the Government of Switzerland, the project was launched in September 1997. Aiming primarily at reducing the amounts of major tannery pollutants such as chromium salts, sulphides and nitrogen compounds, it undertook the introduction of five cleaner technologies:

- high-exhaustion chrome tanning
- low-sulphide dehairing
- compact retanning
- carbon dioxide delimiting
- wet-white processing



Trials conducted at 11 tanneries in Ethiopia, Kenya, Malawi, Namibia, the Sudan, Uganda, Zambia and Zimbabwe suggested good potential for all five processes. While they came well within expectations, the results fell short of being conclusive largely due to considerable process and equipment variations among the participating tanneries. Likewise, a complete cost-benefit evaluation was not possible in most cases since the "penalty cost" of pollution was to be determined by pending legislation.

In terms of potential benefits, high-exhaustion chrome tanning may well be the most attractive technology option. As much as one third of the chrome content of tanning agents used in conventional processes ends up in the effluent. The high-exhaustion (or high-uptake) method requires less chrome and over 90% of the chrome offered ends up in the leather. As one Zimbabwean tanner summarized it, "we want to put the chrome in the leather, not in the effluent." His Harare tannery, Imponente,

is reaping the substantial economic benefits of this cleaner technology that yields savings at both ends of the tanning process (chemical input and effluent treatment). Under the UNIDO project, leather manufacturers in six ESALIA countries carried out high-uptake chrome tanning trials tailored to their capabilities and requirements.



Another project highlight were the insights gained from wet-white processing trials. Kenya's Sagana Tannery and others have obtained excellent results using the new technology to pre-tan leather for shoe uppers. The additional cost incurred is expected to be offset by savings in waste

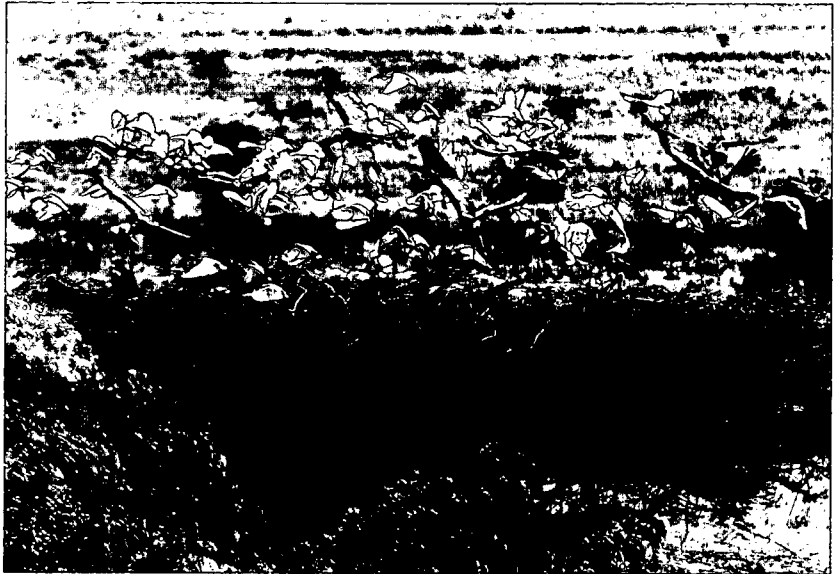
management costs (the process generates chrome-free solid waste). Vegetable tannage trials were also conducted and the sole and harness leathers obtained were of a better quality than those manufactured conventionally at a higher cost.

Broadening the cleaner production campaign

Encouraged by trial results and the keen interest of all the participants in the regional project, UNIDO – backed again by Switzerland, a staunch supporter of the Organization's assistance to the leather sector in Africa – developed a follow-up project launched recently. Focused on ten tanneries, it strives to further facilitate the adoption of environment-friendly technologies. It also fosters the application of a broader cleaner production concept, one that includes the fine-tuning of conventional industrial operations in pursuit of the twin environmental goals of efficient water, energy and chemical utilization and maximum waste reduction.

A key tool in applying this strategy is the environmental audit, the assessment of an individual company's potential to

improve its environmental performance. It covers both the application of cleaner technologies in ways that best suit the company's capabilities and the reshaping of existing housekeeping and production practices to eliminate inefficiencies. The audits are carried out in close collaboration with the National Cleaner Production Centres established by UNIDO and the United Nations Environment Programme (UNEP) in Ethiopia, Kenya, the United Republic of Tanzania and Zimbabwe. The four centres as well as such industry associations as the Leather Development Centre in Nairobi and the Leather Institute of Zimbabwe in Bulawayo also provide technical services and are closely involved in awareness-raising and training activities.

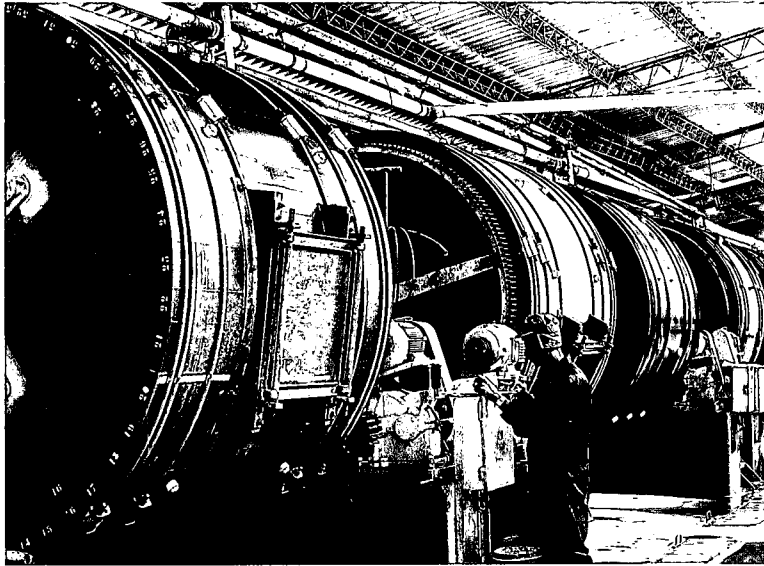


"This new endeavour to ensure a sustainable course of development for the leather sector benefits from the involvement of ESALIA and our other long-time partners in the region," says project manager Aurelia Calabrò-Bellamoli. "More significant still is that, in countries like Ethiopia and the United Republic of Tanzania, we operate within the scope of UNIDO integrated programmes designed to marshal a wide range of resources in pursuit of clearly defined country-specific objectives. The US\$11 million programme for Ethiopia, for instance, focuses primarily on agro-industries (with the food and leather sectors as the foremost targets), and almost 30% of total funding is earmarked for environment-related assistance."

Ethiopia

With abundant raw material from the continent's largest livestock population (estimated at 68 million cattle, sheep and goats), Ethiopia's leather and leather products industries generate the country's second largest export income, outranked only by

proceeds from coffee sales. More than 20 tanneries, most of them private enterprises, process large numbers of hides and skins into wet blue and crust as well as finished leathers. An overwhelming majority of these leather manufacturers, including such large companies as Awash and Ethiopia, operate in Addis Ababa and the environmentally sensitive cattle-raising region of the Northern Rift Valley Lakes. With extensive UNIDO assistance, several



of them have made significant strides in pollution control, and the three-stream effluent treatment plant (which includes a state-of-the-art chrome recovery system) commissioned recently at Awash Tannery is one of Africa's most advanced pollution abatement facilities.

Interest in cleaner technologies and cleaner production practices is on the rise now that the Government has made it clear that it will introduce environmental protection regulations (currently being formulated with assistance under the UNIDO Ecologically Sustainable Industrial Development Programme). Representatives from Ethiopia's leading tanneries have participated in regional seminars and workshops covering both waste management and cleaner leather-manufacturing options. Wallia Tannery was among the companies that conducted high-uptake chrome tanning trials under a previous project, and in recent discussions, managers at Awash and

Ethiopia showed great interest in the economic and environmental benefits of this technology. Wallia is also one of the country's small-scale tanneries that have installed primary effluent treatment systems with UNIDO assistance.

The industry is well aware that, in addition to ultimate cost savings and improvements in environmental performance, the introduction of new technologies would allow an expansion in the range of products. This has become

crucial in recent years when rising prices of hides and skins have cut deeply into the profit margins of wet-blue and crust exporters and prompted them to shift more of their resources to the manufacture of finished leathers as well as footwear and other leather goods. After privatization, Awash Tannery has become part of the Elico Group which includes footwear and leather garment factories. Awash, Ethiopia and other tanneries also supply finished leathers to



several small manufacturers of garments and other products, such as Genuine Leather, which have secured lucrative export outlets.

To raise awareness with respect to such economic opportunities and facilitate a wider acceptance of cleaner tanning technologies, the assistance provided by UNIDO includes a continuous exchange of insights from practical experience as well as advice delivered by experts from leading European leather manufacturers and chemical companies. A widely attended seminar held in Addis Ababa in March 2000 under the Swiss-funded "Tannery Pollution Control and Cleaner Technologies" project was a milestone in this respect. Technology options aiming at reducing water consumption, optimizing the dosage and fixation of chemicals and minimizing the organic pollution load of spent liquors were the subject of eloquent presentations and lively debate. What emerged was a balanced review of cleaner technology options for leather manufacturers in Ethiopia and elsewhere in the region – in-plant pollution containment solutions that are viable in terms of both

cost and product quality. Attended by both industry representatives and environmental protection officials, the seminar engaged the two sides in lively discussions and built a basis for mutual understanding.

Seven Ethiopian tanneries (Awash, Blue Nile, Dessie, Dire, Ethiopia, Modjo and Wallia) are currently receiving cleaner production assistance from UNIDO under various projects, including the recently



launched "Fine-Tuning of Conventional Tanning Technologies in the Leather Industry in Eastern and Southern Africa." This regional project was developed on the basis of experience, recommendations and specific requests gathered during the implementation of its forerunner ("Introduction of Wet-White Leather Processing and Other Cleaner Technologies in ESALIA Countries"). It aims at helping the industry reap cleaner production benefits mainly by

an initial elimination of pockets of process inefficiency.

To identify the targets of such interventions, the National Cleaner Production Centre established recently in Addis Ababa conducts environmental audits (or assessments of cleaner production options) at each participating tannery. Most recommendations yielded by such audits involve low-cost or no-cost measures to modify conventional manufacturing processes or housekeeping practices (such as chemical storage). With no significant burden on a company's balance sheet, these interventions often generate sizeable benefits by reducing water and energy consumption, improving the quality of the shop-floor environment and containing pollution.

Investment in cleaner technologies is likely to become an attractive option at a later stage. Particularly well positioned to take this step are the larger tanneries (Awash, Ethiopia) with an adequate equipment base, such as the advanced drums with powerful drives required for high-uptake chrome tanning. The discharge standards that will be gradually imposed once the new environmental legislation is adopted can certainly be expected to be an additional incentive in this respect.

Zimbabwe

Zimbabwe's leather industries are a leading sector in the country's developing economy, with several companies ranking among the continent's most successful exporters. All tanneries are private enterprises and some are associated with downstream facilities manufacturing footwear and other leather products. With processing capacities above 10 tons of raw bovine hides per day, each of Zimbabwe's major leather manufacturers has to deal with large amounts of effluent and solid waste under growing pressure from environmental regulations that tend to be more stringent than in many other places, including non-African countries. The high environmental protection standards are largely the consequence of the high stakes in such industries as agribusiness and tourism:



the country's richness of soil and wildlife and its spectacular landscapes are highlights of its heritage and key sources of income.

Zimbabwe is an obvious role-modelling candidate in the current regional project, the staging ground for workshops and seminars with participants from the other three ESALIA countries in Southern Africa: Malawi, Namibia and Zambia. Recipients of UNIDO assistance in cleaner production under previous projects, model tanneries such as Imponente in Harare and Bata in Gweru have a good record of willingness to share insights gained in their efforts to contain pollution in ways that are economically viable. Furthermore, several tanneries in Zimbabwe have benefited from environmental audits conducted by the National Cleaner Production Centre established in 1995 under the UNIDO/UNEP Programme.

The management at Imponente Tanning is manifestly aware of the business dividends of cleaner production. It applies consistently an "environment-oriented cost management" mechanism designed

to discern ways and means of achieving cost gains by reducing waste. The company is currently building on its cleaner production achievements such as a remarkable success with high-exhaustion chrome tanning and a very low water consumption (largely due to transfer recycling).



All of Imponente's production is now tanned according to the high-exhaustion method, with annual savings in chrome purchases estimated at US\$100,000 plus substantial benefits under various environmental aspects. The use of water-based finishers (instead of solvents) and other cleaner technologies has entitled Imponente to take eco-labelling credit for most of its over 100 types of leather for footwear and furniture upholstery. The tannery won the Environmental

Protection Award granted by the Natural Resources Board of Zimbabwe, and its top-level managers have been regular speakers at UNIDO seminars and workshops on tannery pollution control.

Under a recently completed UNIDO project funded by the Netherlands, Midiron Enterprises in Bulawayo acquired and tested a hair-separation unit. The equipment replaces the hair-burn process in the liming operation and presses the "saved" hair into a compact mass that can be later used in the production of fertilizers and soil conditioners. The company reports drastic reductions in tannery pollutants such as COD (30% to 50%), suspended solids (40% to 60%) and sulphides (20% to 30%). UNIDO introduced a similar unit at Nakuru Tanners in Kenya, located in the immediate vicinity of Nakuru National Park, and the equipment contributed largely to a life-saving improvement in the tannery's environmental performance.

Zimbabwe Bata Shoe Company's tannery in Gweru, the country's oldest, has an excellent record of environmental care and a

long-standing commitment to good housekeeping and cleaner production through technology upgrading or adaptation. Assisted by an internationally renowned UNIDO expert in tannery pollution control, the company has achieved remarkable results in harnessing the potential of two relatively new waste management technologies. A small-scale anaerobic digester of tannery sludge has been in satisfactory operation for over one year. Digestion



rates of up to 95% confirm the feasibility of a full-scale facility (which the company intends to build in the near future). In addition to the benefit of an almost complete elimination of effluent-treatment solid waste, the process generates biogas that can be used as an energy source.

More immediately remarkable is the unexpected sight at the end of a short drive through the nearby maize fields: a large pond of tannery wastewater teeming with waterfowl (*above*). The natural science behind the miracle is the induced proliferation of *Spirulina* algae that thrive on what is left of the effluent pollution load after treatment. The wastewater is fed gradually from a smaller adjacent pond and soon becomes green, odourless and hospitable to fish, frogs and other aquatic life. A recent survey by a visiting ornithologist identified 21 species of waterbirds from ducks, egrets and herons to flamingos and fish eagles.



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