

# A Water Supply and Pollution Crisis in Lesotho's Textile Factories: The Problems of Footloose Investment

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## Executive Summary

\* Lesotho has seen a massive surge in investment since the African Growth and Opportunity Act was signed in to law in the USA in 2000, now a third of all apparel traded through AGOA is from Lesotho.<sup>1</sup> Investment, mainly from Taiwan, has predominantly been focused around 'water-greedy' textile factories.

\* Unfortunately, infrastructural support has not kept pace with the rate of investment. Now Maseru, Lesotho's capital and the place where much investment has been situated, is facing a double crisis:

1. A water supply shortage is reaching a critical level. As DFID state, "Without water the industry simply shuts down."<sup>2</sup>
2. The effluence produced by the textile factories fails to get treated and is pumped into the water system. This is illegal in all other countries and the Environmental Bill of 2000, when signed into law will also make it illegal in Lesotho.

This report details the causes and consequences of this situation, which could reverse economic growth, "in the absence of any intervention or resolution of the constraints... employment... will decline sharply post 2004".<sup>3</sup>

\* Possible solutions to this crisis are discussed, and particular attention is paid to a DFID proposal that treatment plants operated by factories could recycle 75% of industrial waste water. This could create a 'win-win' situation in which cost-recoverable investment in water treatment plants could provide a sustainable resource base allowing industrial expansion.

\* However, we point towards the inability of stakeholders to drive forward appropriate plans and projects.

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<sup>1</sup> UNITE! Statistics

<sup>2</sup> Salm et al. (2002)

<sup>3</sup> Salm et al. (2002)

## **Introduction: AGOA and Environmental Issues**

The United States of America's African Growth and Opportunity Act (AGOA) has been instrumental in bringing in new investment to Lesotho. Signed in by President Clinton on May 18<sup>th</sup> 2000, "The Act offers tangible incentives for African countries to continue their efforts to open their economies and build free markets."<sup>4</sup> 38 textile companies are now based in Lesotho, and following AGOA, in the past 2 years, 7 existing companies are seeking expansion and 12 new companies have expressed strong interest in investing in Lesotho. Employment rose by 56% in 7 months from 20 587 in March 2001 to 32, 233 in November 2001.<sup>5</sup>

The broad intention of AGOA is to create sustainable, long term development in Africa by "transforming the economic landscape... stimulating new trading opportunities for business.. bringing hundreds of millions of dollars of much-needed investment into the region."<sup>6</sup> Under AGOA, Lesotho has become the largest apparel exporter in Africa to the US.<sup>7</sup> But the long term sustainability of the investment that AGOA has brought in is questionable. Lesotho's capital, Maseru where most of the investment has been introduced, now faces a double challenge to survival and growth:<sup>8</sup>

1. Water is running out. There is barely enough water to supply the industries and people in Maseru as it stands. Without reform of water policy, growth will be limited.
2. Waste water from various factories is not being adequately treated, therefore producing levels of pollution that "is against all norms and will become illegal in Lesotho"<sup>9</sup>

If a water and pollution policy to support the industry is not conceived, DFID project that Maseru could face a crisis that might include employment dropping from a projected 30,000 to a level of 15,000 in 2008.<sup>10</sup>

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<sup>4</sup> [www.agoa.gov](http://www.agoa.gov) 18/11/2002

<sup>5</sup> Salm et al. (2002) pp. 3, 15, 23. Now referred to as "DFID Report"

<sup>6</sup> AGOA Comprehensive Report (2002) p1

<sup>7</sup> 1/3 of all apparel traded through AGOA is from Lesotho, it ranks as the highest apparel trader under AGOA with Madacascar and Kenya second and third respectively with less than half the trade – Statistics UNITE! (2002)

<sup>8</sup> This has been acknowledged by, the World Bank, Lesotho Government, US Ambassador, DFID

<sup>9</sup> Salm et al. (2002) p41. Though according to our sources (Interview: WASA 1/11/02), it is illegal, but fines are so low they are worthless. Restructuring economic policies to bring these in line is merely part of the reforms.

<sup>10</sup> Salm et al. (2002)

## **Water Use In the Textiles Industry**

This section details the cycle that water used in the textile industry goes through.

Textile factories fall into a number of broad categories, depending upon the manufacturing processes used. In this report we are mainly concerned with wet industries that produce woven denim apparel. Until the Nien Hsing textile mill, currently under construction, goes into operation, the factories in Lesotho merely make clothing (a “cut, trim and wash” process), using material that has already been produced abroad. This report specifically focuses in on the washing stages of the production process. It is here that the vast quantities of water are required and that chemicals and dyes are added to the water, that give rise to the concerns at hand. Figure 1 gives a graphical representation of the production processes.

Figure 2 gives an outline of the water cycle. It identifies the main water sources that feed Maseru, the amounts going into factories and waste water disposal.

### **Inputs**

Residential and industrial areas in Maseru obtain their water mainly from the Caledon River, which is supplemented by water from the Maqalika dam when river levels are low. This together provides around 28 MI/day to Maseru, approximately a third of which is used in to provide water for the textile industries, predominantly the “wet industries” (denim textile factories). The water is fed through the Maseru Water Works and into the Maseru supply infrastructure. It is estimated that 30-40% of the water entering the supply infrastructure is lost through leaks.

### **Factory Processes**

Around 12 MI/day of water is supplied to the factories of which about 15% or 1.8MI/day is lost due to evaporation and spillage's within the factories. The rest is used in the production process and pumped out as waste water.

The manufacturing process (See Figure 1) involves firstly removing the size that was added to the fabric prior to weaving. Desizing usually consists of an enzyme washing process in which starch and waxes are removed. Effluent will therefore contain the size and the enzyme. Secondly stone washing takes place using pumice stones (and enzymes in some production models), which produces a sludge and removes dye from material. Thirdly bleaching takes place with either hydrogen peroxide (a good practice) or sodium hypochlorite (which is not environmentally friendly). Fourthly softening comprises of washing the fabrics to create certain feels, detergents will be used here which are generally alkaline.<sup>11</sup>

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<sup>11</sup> Pers Comm. Dr. Barclay

The effluence produced by these processes is characterised by being highly coloured blue, having a bad odour, varying in pH from 3 to 11 and in temperature from 10 to 65 degrees Centigrade. The whole process having a high COD (chemical oxygen demand).<sup>12</sup> The exact chemical composition of the effluence will depend upon the specific production processes being used and will vary from order to order.

### **Waste Water**

From the factories, wastewater goes three ways. Some is fed into the sewage system to the government run Ratjomose Waste Water Treatment Works (RWWTW). This is designed to cope with normal sewage and brewery effluence, not effluence produced by textile factories. Other effluence goes into factory owned sitting tanks (also called oxidation tanks), before moving on. More still is put directly into a stream (Mosenyathe). All three processes fail to treat the effluence effectively which then feeds into the Caledon River. The Caledon River then follows the Lesotho/South Africa border, before heading into South Africa, in the Orange Free State.

### **Water Dilemmas Due to the Textile Investment**

The water cycle as it stands, causes numerous problems to the industry, the urban population in Maseru and the Government of Lesotho. This leads us to question the sustainability of the textile industry in Maseru.

### **Ineffective Production Processes**

As water supply is at its limit in Maseru, there are often times when supply is cut off to factories and the urban population. Companies have a number of strategies to try and smooth off the variations in supply, which introduce extra costs and inefficiencies into the production process. The strategies employed to cope with this issue are quite extraordinary and reveal the extent of the water crisis that factories face.

Managers prefer to keep production within Lesotho and even truck in water for the factories from South Africa and run late night shifts when water supply is available. At times even these measures fail to provide enough water so unwashed garments are transported out of the country, into South Africa where the stone washing, bleaching and softening takes place.

The methods companies employ to try and keep production running at full capacity raises costs, and can also heighten labour tensions in the factories. As such, each of these introduces additional costs and inefficiencies into the factory.

### **Constraints to Further Investment**

The newest Nien Hsing factory requires a water supply of 7.5 MI/day an increase of 26% on the current supply to Maseru.<sup>13</sup> Any other new investment

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<sup>12</sup> Pers Comm. Dr. Barclay

<sup>13</sup> Salm et al. (2002)

will also require an increase in water supply to the new factory, which at present can not be coped with. Furthermore, as new investment moves into Maseru, so it is likely the urban population will increase, requiring an extension to residential water supply, at the same time as resources are being stretched to provide for the industry.

### **Water Shortages for the Urban Population**

Since the industrial sector in Maseru consumes about one third of the water for the city, there are periodic cutoffs to water supply for residents in Maseru. Because of the increased investment over the recent period, urbanisation has gone hand in hand with industrialisation, in 1966 Maseru's population was 28,000 by 1995 it had reached 160,000.<sup>14</sup>

An inadequate provision of water to the urban population increases the risks of cholera or typhoid outbreaks. Already we have seen outbreaks of blood diarrhea due to an insecure water supply in Maseru.<sup>15</sup> A secure water supply to the growing urban population is a key objective that needs to be resolved for continued economic growth. When the textiles factories in Maseru already consume about one third of the water for the city, there is a groundswell of public discomfort that the Government is neglecting the needs of its citizens.

### **Waste Water Health Risks**

Due to the burgeoning population, peri-urban settlements have sprung up throughout Maseru. Much of this new influx have taken land near the textile industries that we are looking at. At the present moment, effluence from the factories is passing through the settlements untreated. Due to the lack of space residents are forced to graze animals in land which is periodically flood by these streams, when fibres from the factories build up in them. Residents are forced to unblock the streams of these fibres by hand to stop the flooding.

### **The Caledon River**

As mentioned earlier, effluent is discharged without treatment into the Caledon. This has led to the Caledon being one of the most turbid rivers in Southern Africa (readings are in excess of 14 000 NTU). And the current textiles investment is likely to increase by 20% the proportion of sediment and sludge in the river.<sup>16</sup> This is against treaty conventions made with South Africa.

## **Opportunities For Reform**

This report details the solutions that have been proposed to the deal problem of water supply and effluent treatment. Particular attention is paid to the recycling solution favoured by the DFID report, which it is suggested, would provide a long term future for sustained, committed investment by textile manufacturers in Lesotho.

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<sup>14</sup> Wright (1999) p79

<sup>15</sup> Mopheme (2001)

<sup>16</sup> Salm et al. (2002) p7

### **Heighten Maqalika Dam**

The Maqalika Dam, that provides additional water supplies to Maseru, when the Caledon is low, could be heightened. The World Bank estimates would take around three years to complete. But the DFID Report suggests it will do no more than supply the initial needs of the new Nien Hsing denim factory that is being constructed.<sup>17</sup>

### **New Dam at Metalong**

One option is to build a new dam to increase the capacity that Maseru can draw on. At the moment, under the current tariff regime, another dam is not really feasible. It will also take a long time for it to get built as it is a major construction project. Alongside this, such projects have the potential to be politically explosive, as was seen in the LHWP.<sup>18</sup>

### **Water Transfer from Lesotho Highlands Water Project into Caledon**

The Lesotho Highlands Water Project (LHWP) was created to sell what was considered an abundant supply of water in Lesotho to meet South Africa's needs.

There are suggestions that the LHWP could be used to supply Lesotho's industrial and urban areas. By pumping water into the Caledon, from the LHWP, supply should be assured to Maseru.

To do this will also require an overhaul of supply infrastructure in and around Maseru as at the moment the maximum capacity that can be drawn from the Caledon, once upgrades are finished, is 34.7Ml/day.

### **Leakage Control**

According to reports somewhere in the region of 30% of all water entering the supply infrastructure is unaccounted for by the time a consumer uses it. As such a simple solution is to repair the system to reduce leakages. This is a good short term solution, though does not take into account the longer term expansion needs that are predicted for the industry and the urban population.

### **Recycle Water From Ratjomose Waste Water Treatment Works**

Recycling wastewater offers the opportunity to deal with both water supply and effluent problems at the same time. One option is to upgrade the RWWTW and recycle water at this point.

However, placing the cost of treatment on the state does not provide the polluter with an incentive to improve production methods. It is also problematic in "a very poor country and for every great intention you have, there are always 15 competing projects. Where right now the competing project is the famine."<sup>19</sup> Also by creating a situation where all effluence is fed into one

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<sup>17</sup> Salm et al. (2002)

<sup>18</sup> Bond (2002)

<sup>19</sup> Interview : Loftis 1/11/02

system, rather than keeping different streams of pollution separate and treating them at the point of production, can create extra costs.<sup>20</sup>

### **Recycling Water at Factories**

The DFID report recommends that factories recycle wastewater. The project could create a 'win-win' situation since:

- Supply and pollution would be solved, allowing a sustainable expansion of the industry. It is estimated 75% of water used in the production process could be recycled.
- The initial investment in treatment plants could be recouped rapidly, by reuse of chemicals.

For example, the European Union introduced a series of mitigation measures, which when undertaken have recovered costs in anywhere from 3 years to a few months. This depends upon the Government of Lesotho enforcing a polluter pays principle that rewards sustainable investment. When the Environmental Bill of 2000 is signed in, there will be penalties of up to M100 000 or ten years imprisonment per infringement.<sup>21</sup>

Recycling at factory level, through measures such as 'waste minimisation clubs' provides a better method than a state led solution. At this level, different effluent streams can be kept separate leading to a lower cost of recycling and the reuse of chemicals.<sup>22</sup> In South Africa, waste minimisation clubs showed "that recurrent first year savings of two percent to seven percent of turnover can be achieved through a formal programme."<sup>23</sup> Such measures would be a big step towards encouraging sustained economic investment in Lesotho's textile industry.

### **Projects Undertaken**

The dual issues of water supply and effluent treatment have been identified by a number of groups as requiring dealing with. Yet in general, the projects that have been created have failed to deal with the issues at hand.

#### **European Investment Bank Investment**

In 2001 the European Investment Bank (EIB) had initiated a project which would deal with effluent treatment at the Thetsane industrial estate.<sup>24</sup> This failed to get off the ground. It seems that the EIB have withdrawn from this project leaving leadership to the World Bank.<sup>25</sup>

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<sup>20</sup> Barclay et al. (1996)

<sup>21</sup> Salm et al. (2002)

<sup>22</sup> Barclay et al. (1996)

<sup>23</sup> [www.nu.ac.za](http://www.nu.ac.za) 2/12/2002

<sup>24</sup> Mopheme (2001)

<sup>25</sup> World Bank (2001)

### **World Bank Loan**

The Government of Lesotho, does recognise that water and pollution is a problem and has called in the World Bank to finance a project to try and deal with it.<sup>26</sup> “The project development objective...is to support the vision of the Government of Lesotho to secure sustainable, adequate and clean water supply services for consumers living in the Lowland areas.”<sup>27</sup>

But there are doubts as to the viability of the World Bank proposals. To increase the available water supply, they are looking at raising the height of the Maqalika Dam and also increasing the transfers into this dam. To treat effluence, they are looking toward the RWWTW and oxidation tanks that are already in place and looking to extend them. The DFID report suggests that these options are not economically viable.

### **Government of Lesotho Task Force**

In trying to cope with the problem of utilities in general (utilities include water, telephones and electricity) the government set up a task force to look at and implement plans. In its first year this task force, with representatives from government, the LNDC and the utility providers, had a budget of M54 million and in this its second year, will have a similar budget.<sup>28</sup> This money has predominantly been spent on securing water supply for the new Nien Hsing textile factory.<sup>29</sup>

It is unfortunate that water supply has been seen as a matter of obtaining more of a rapidly draining resource, rather than focusing on the possibility of recycling.

### **Industry**

As has been argued above, the costs of implementing effluent treatment in their factories is easily recovered and allows a sustained increase in investment.

Of all the companies in Lesotho, only Nien Hsing and CGM have indicated any interest in building recycling plants. However according to sources, it seems CGM has not begun construction and does not appear to have plans to do so in the near future.<sup>30</sup> And Nien Hsing, whilst its investment is laudable, showed a remarkable reluctance to invest in such treatment plants, even when the company uses similar technology elsewhere in the world. It took sustained government pressure to achieve Nien Hsing's new investment.<sup>31</sup>

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<sup>26</sup> Interview: Loftis 1/11/02

<sup>27</sup> World Bank (2001)

<sup>28</sup> Interview: Mahase 1/11/02 and Salm et al. (2002)

<sup>29</sup> Interview: Mahase 1/11/02

<sup>30</sup> Interview: Heath 25/11/02

<sup>31</sup> Interview: WASA 1/11/02

## Conclusion

Whichever solutions to Maseru's water crises are chosen, the largest risk is that nothing is done. One of the main responses of stakeholders to the DFID report was that it was all too likely that it become "just another survey to be shelved".<sup>32</sup> And the report itself notes "...no one is stepping forward to drive the process..."<sup>33</sup> This is a worrying situation because "it is clear that the costs associated with lack of supply area incalculable. Without water the industry simply shuts down."<sup>34</sup>

Without sustained collective action in the area of water supply and pollution, it is likely that the AGOA initiative will just perpetuate a footloose pattern of investment by an international textile industry rather than provide an opportunity for sustained investment and growth that lies at the heart of the AGOA vision.

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<sup>32</sup> Salm et al. (2002) Annexe p 6

<sup>33</sup> Salm et al. (2002)

<sup>34</sup> Salm et al. (2002)

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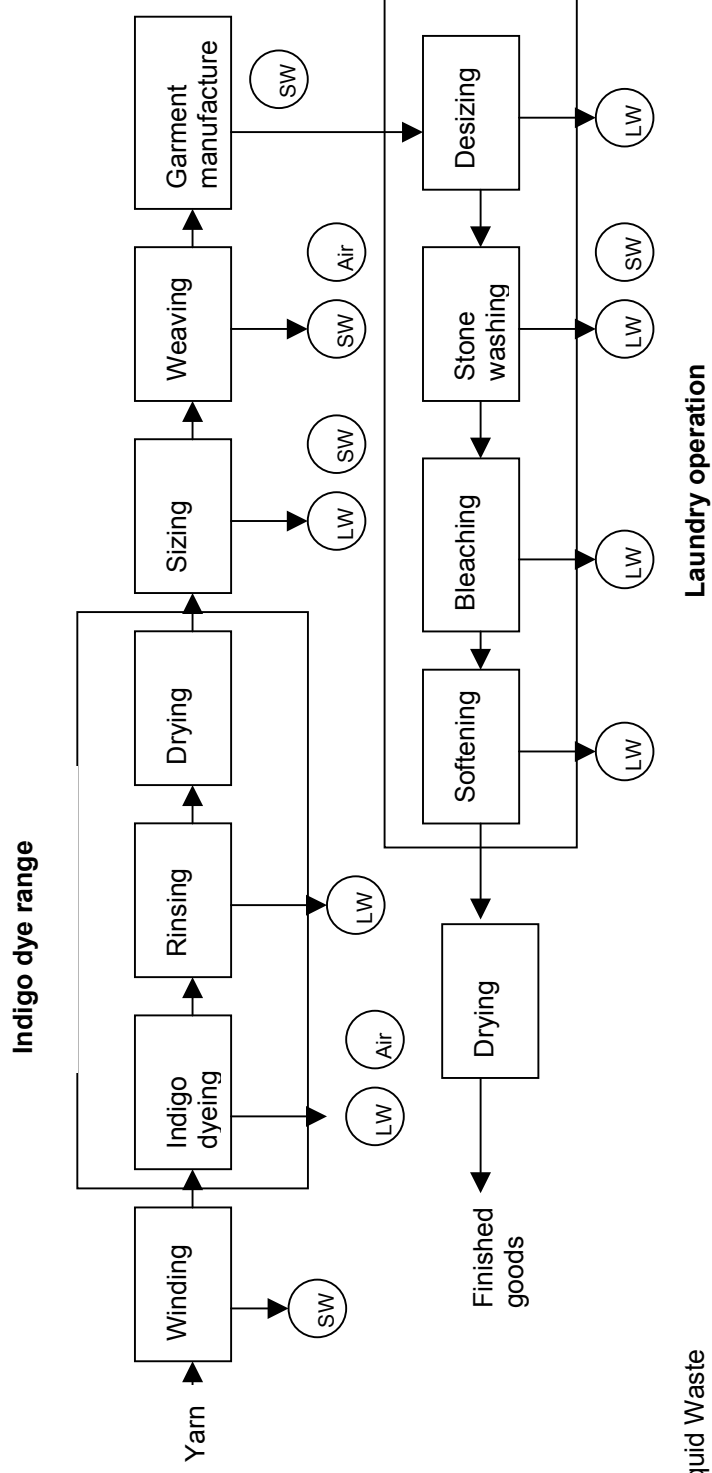
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Figure 1

### Simplified Process Flow for the Manufacture of Denim Jeans



LW: Liquid Waste  
SW: Solid Waste

**Figure 2**  
**The Water Cycle in Maseru, Lesotho**

