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SUSTAINABILITY OF WATER AND SANITATION SYSTEMS

Role of industries in sustaining water quality

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NAIROBI THE CAPITAL of Kenya and a major industrial town in the region has an estimated population of 2,000,000 people. This population far outstrips the available facilities to the extent that a large percentage of the populace remain without adequate and satisfactory services, e.g. water, sanitation, and garbage collection.

There are several rivers draining through the city of Nairobi, the bigger ones include Ngong, Nairobi, Mathare, Ruaraka, Kasarani. All these rivers eventually drain into Nairobi river which in turn empties into the Athi river.

Most people in rural areas of Kenya use untreated water from rivers and streams for drinking and other domestic activities. Where water treatment is provided in piped water supplies, treatment failures are known to occur frequently due to mechanical problems, lack of chemicals and other reasons. It is therefore important that pollution of streams and rivers is reduced to a minimum.

From existing reports on the status of the Nairobi rivers (Nyikuri, 1994; Otiemo 1991a, 1991b) it emerges that there is a general awareness of the pollution problem, its levels and trends. It is also evident that the existing legislation, while requiring some amendment and review is adequate but that there is not enough enforcement. These findings also indicate that there is little commitment by industrialists to play the role they should play in order to protect and indeed improve the quality of the environment.

Sources of pollution

There are several categories of pollution entering Nairobi river. These include, but are not limited to:

- Industrial effluent emanating from factories, godowns, business premises especially from the industrial area. There is no justification for this state of affairs as Nairobi City Council (NCC) by laws allow industries within 200 feet of a sewer to connect to it. Even when this is not the case, industries can easily obtain permission from NCC to install a form of treatment that will enhance environmental conditions.
- Raw sewage from blocked, broken or overloaded sewers.
- Sewage and other polluting agents from the informal sector such as slums, markets, jua kali premises.
- Effluent from public and private sewage treatment works. This happens when sewage is not properly treated as it passes through the treatment works. Industries could also indirectly pollute the rivers by

discharging wastes that are not compatible with other sewage and thereby interfering or inhibiting the biological processes responsible for sewage treatment.

- Effluents from petrol stations and other garages.
- Surface runoff.
- Solid wastes/garbage dumped in rivers and their surrounding.

Pollution profiles

From the pollution profile of Nairobi river, it is evident that it becomes increasingly polluted from the point it enters the city. The pollution levels reach their peak as the river passes through heavy industrial and or commercial areas and reduces again when the river goes through less polluted areas and recover quite rapidly once the river leaves the city. (Note the improved dissolved oxygen levels in Table 1). This is attributed mainly to self purification due to oxidation, especially where the gradient is steep or at falls, and is aided by the favourable temperatures and light conditions commonly experienced in Nairobi.

It is possible to tell by looking at the profiles at what point a dose of pollutant has been injected into the river and hence easier to establish the culprit. Unfortunately, the enforcement mechanism of the law is quite poor and so culprits get away with such acts. The ongoing National Environmental Action Plan (NEAP) process is aimed at

Table 1. Oxygen levels along Nairobi River

Station	Distance downstream (Kms)	Oxygen level (mg/l)
Nyongera Up	0.0	2.60
Nyongera Down	3.5	7.00
Muthuri Road	5.0	6.40
Loreto Convent	10.0	6.60
Chiromo	13.5	6.76
Kerichwa	14.0	6.60
Museum	15.0	7.40
Kijabe Street	15.5	7.24
Roundabout	16.0	2.60
Racecourse B	17.0	1.90
Shauri Moyo	20.0	0.27
Outer Ring Road	24.0	1.15
Kariobangi Up	26.0	2.60
Kariobangi Down	26.5	3.20
Mathare	30.0	0.16
Njiru	36.0	0.30
Nairobi Falls	51.0	3.36
Athi at Munyu	75.5	5.80
14 Falls	86.0	6.80

redressing this shortfall and one hopes that once this is implemented, industrialists can see their role in preventing further pollution of existing water resources in Nairobi and in Kenya in general.

Trend of pollution

Data gathered over the years (Otieno 1991a, 1991b; Office of the President 1991) regarding the pollution of Nairobi river indicates that the level of pollution has not changed much in the last ten years or so. This can be attributed to:

- The expansion of the sewage works to a large portion of the city and which most industrialists not connected should take advantage of and connect.
- The flushing effects of the rains on the rivers.
- The favourable nature of the tropical climate which allows for a significant amount of self purification.

All the above notwithstanding, the rivers are still heavily polluted beyond acceptable levels for domestic, industrial and agricultural origin.

The role of industries in water pollution control

The main culprits in the pollution of Nairobi river are industries. Given the level of environmental awareness and indeed the increase in the same, it is in the interest of these industries that they keep Nairobi river clean. However, since the benefits to such industries would be indirect and long term, most of them do not see the need to be involved in such measures. For example, very few of the industries surveyed were willing to pay to install pollution abatement equipment despite the fact that many of them were not only aware that they were polluting but even knew that there was technology available to deal with this menace.

When one looks at this scenario in depth, it becomes imperative that certain incentives, e.g. tax rebates presumably by the government need to be put in place if industrialists are expected to spend money on pollution abatement. This approach has been tried with success in some countries (Otieno, 1991b).

The question of awareness on the part of the consumer could also force industrialists to start worrying about pollution abatement. For example, if consumers rejected products on grounds that they were environmentally unfriendly, industrialists would be forced to act responsibly. Another way of enforcing environmental responsibility is for companies that do not protect the environment be denied access to the international market (it has been argued that such companies are actually spending less on production costs and are therefore enjoying an unfair advantage). A stringent approach to ensure that they do not continue to enjoy this benefit is to ensure that they play a positive role in environmental pollution control.

What about sustainability?

It is not just enough to insist that companies inject resources into environmental pollution control. The entire process has to be sustainable. And so how do we built sustainability in the pollution control of Nairobi river?

There are certain rules for ensuring sustainability. Goldsmith (1992) suggests the following for ensuring sustainability:

- Securing beneficial commitment to priorities, projects and interests, in this case, the process of pollution control of Nairobi river.
- Choosing an attainable organizational mission and allocating resources to these attainable goals.
- Having a strategy for sustainability early in the life of the project, in this case, trying to implore on all players the need for keeping Nairobi river clean.
- Building a network of alliances among the beneficiaries of the act, i.e. pollution control.
- Differentiating perceived as against actual pay-offs.
- Providing avenues for continuous training of both industrialists, enforcement officers and the public in general.
- Having a blend of both short and long term planning horizons.

Conclusions

Given the increased environmental awareness and existing technologies for pollution abatement, and the desire by consumers for products of a green nature (whose production processes have positive regard for the environment), it would seem naive for industrialists to try and save money today instead of putting it into pollution abatement strategies. It is therefore suggested that the government of the day in an effort to try to ensure a market for the industries tomorrow, i.e. sustainability, they should provide certain incentives for industries to see the benefits of investing in environmental protection. Any industrialists with forward planning would not be waiting for the government to provide these incentives but should instead lead the way in environmental protection.

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