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ACCESS TO SANITATION AND SAFE WATER:
GLOBAL PARTNERSHIPS AND LOCAL ACTIONS

Improving water quality through integrated water resources management

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The Densu River supplies potable water to the more than 1 million people in Ghana. The water quality of the river deteriorated as a result of the fast-uncontrolled urbanization and improper waste management practices in the basin. The implications included high water treatment cost, loss of biodiversity, loss of livelihoods and income, high disease prevalence rate and water use conflicts. The Water Resources Commission of Ghana started implementing Integrated Water Resources Management (IWRM) in the basin in 2002. The major step was to establish a Densu Basin Board to coordinate activities within the basin and manage it on a holistic manner. This paper highlights the improvement in water quality as a result of activities initiated in the Densu River Basin during the past few years. The activities are ongoing; hence, the results reported here should be considered preliminary and may be enriched as new experience emerges from the Densu Basin complemented with similar interventions in other river basins.

Introduction

The Government of Ghana created the Water Resources Commission (WRC) through an Act of Parliament (Act 522 of 1996) to be responsible for the regulation and management of the country's water resources, and for the coordination of any government policies in relation to them.

In 2000, the WRC, embarked on a study to identify and prioritize water resources problems in Ghana, which led to the conclusion that the Densu River Basin was the most stressed river of economic importance (WRI, 2000). In an effort to restore the ecology and improve the quality of its waters the WRC started implementing Integrated Water Resources Management (IWRM) activities in the basin in 2002.

The Densu River stretches 116 km from its source in the Atiwa Range in the Eastern Region to the Sakumo Lagoon in the Greater Accra Region where it enters the sea (Fig. 1). It has four reservoirs along its course of which the Weija Dam, located at the lower course of the river is the largest. The river is a source of potable water to over one million people within the basin.

Pollution of the Densu Basin

Pollution of the Densu River Basin is widespread and identified causes are dumping and discharges of untreated urban domestic and industrial wastes, leaching of agro-chemicals from large commercial farms, as well as bad fishing practices such as the use of chemicals and rotten tree trunks. Further more Faecal pollution is widespread in the Densu Basin due to lack of or inadequate sanitary and waste disposal facilities leading to disposal of domestic sewage and garbage into the river directly (Ampofo, 1997). In one of the larger townships, Nsawam, an estimated 33 metric tons of waste are generated annually much of which are disposed of in farms sited on the fringes of the town close to the river. This waste contaminates surface water sources through runoff.

In the Weija Lake, high nutrient levels have enhanced the proliferation of algae thereby increasing water treatment costs. Persistent algal blooms were recorded in the Weija Lake and as high as 60-140 mg/l alum was required to remove the color and the turbidity (Ansa-Asare, 1996, 1998). It costs three times as much for water treatment at Weija as compared to other treatment plants in the country such as at Kpong. This has made the water very undesirable.

The problems of the Densu have been of grave concern because of high levels of pollution, resulting from the fast-uncontrolled urbanization and improper waste management practices (Nii Consult, 2001; MWH, 2003). Improper land use has also resulted in erosion leading to siltation of the river channel and consequently

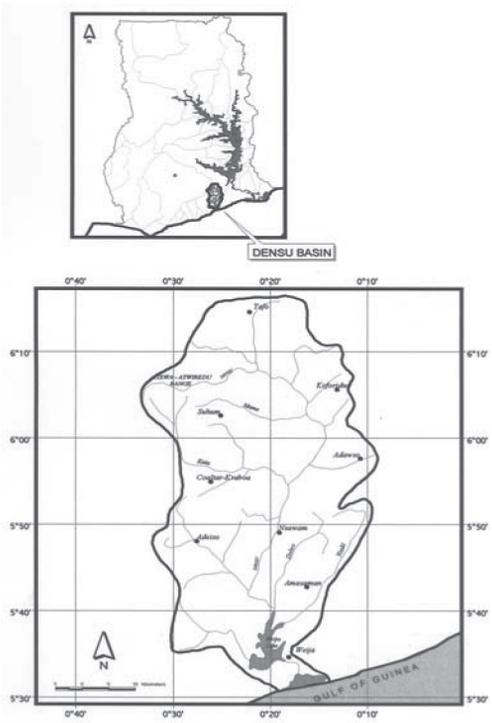

Figure 1. Location of the Densu Basin

Source: WEDC - Source

flooding and water shortage in the Densu basin in the rainy and dry seasons respectively. Risk associated with pollution of the Densu River can be summarised as follows.

- health hazards,
- algal toxicity,
- loss of livelihoods
- loss of biodiversity
- high water treatment cost
- water use conflicts

The response

Many interventions have been initiated over a period of time. Thus, in the beginning of the 1990s consultations were held with of representatives of local government, District Assemblies within the basin and relevant government and research institutions as well as the NGO community to identify actions to be taken to ameliorate the deteriorating situation (Nii Consult 2001). Since then the issue has regularly been discussed publicly, and several surveys and studies presenting proposals for addressing the problems have been put forward. However, in spite of these efforts, the planned programs have not been effectively translated into concrete actions on the ground, in part, due to lack of funds and lack of adequate capacity of the various District Assemblies.

The activities initiated by the Water Resources Commission in the Densu Basin were meant to rejuvenate the process towards introducing IWRM with a firm anchorage established among all interested parties and stakeholders in the basin. A Densu Basin Board (DBB) was established to coordinate activities within the basin and manage it on a holistic manner. The membership of the Densu Basin Board includes representatives from District Assemblies (local government structures) within the Densu basin, Regional Coordinating Councils under which Densu basin falls, various decentralized government departments, the Environmental Protection Agency, NGO and the traditional authority.

Currently, the Densu Basin Board is undertaking major activities to restore the ecological health of the Densu. Areas covered include:

- Public awareness campaign programs
- Capacity building,
- Monitoring of the catchment from upstream to downstream in a systematic manner;
- Collaboration with the major relevant local government institutions in the basin on proper waste management practices.

Examples of actual activities include the following

1. Radio programs have been aired to raise awareness on water resources management along side school education programs.
2. Awareness raising programmes for each of the districts in the basin have been conducted, which have served to improve the appreciation of many of the members of the District Assemblies, most of whom were unaware of the effects of their activities on water bodies.
3. At each sitting of the board a training program is included to keep the members well informed on related issues.
4. Study and monitoring tours for board member are organized periodically from the source to downstream catchment areas to ascertain problems within the basin and obtain first hand information on problems to be tackled.
5. While the representatives of districts on the DBB, have facilitated the implementation of IWRM activities, institutions that serve on the board have increased collaboration among themselves and other stakeholders for synergistic effect.

Improvement in water quality

As a result of the above, some waste dumping sites adjacent to the river have been removed, for example, at the Nsawam Bridge (midstream Densu River), and at Kasoa (Jei River a tributary of the Densu). The Suhum/Kraboa/Coaltar District Assembly has also relocated its dumping site to avoid polluting the river. Furthermore, a site for waste treatment has been identified for 3 local government authorities. In general, the presence of the DBB and its monitoring activities within the basin has increased awareness in various communities on the need to sustain environmental conservation practices.

The Water Resources Commission embarked on a systematic water quality monitoring program in 2005 and 2006 in the Densu Basin to determine trends in water quality. Four monitoring sites were included in the program i.e. Potroase, which is at the source of the river, Mangoase and Nsawam at the midstream and Weija at the downstream.

Table 1 Water quality classifications of surface water

Class	Range	Description
I	> 80	Good -Unpolluted and/or recovering from pollution
II	> 50 – 80	Fairly good
III	25 – 50	Poor quality
IV	< 25	Grossly polluted

A Water Quality Index (WQI) was used for the assessment. The index was developed to interpret measurements of ambient water quality parameters (dissolved oxygen, biochemical oxygen demand, ammonia, faecal coliform, pH, nitrate, phosphate, suspended solids, electrical conductivity and temperature). The index is classified into four categories: good, fairly good, poor, and grossly polluted as depicted in Table 1. The index thus indicates the degree to which the natural water quality is affected by human activity. Results showed that the quality of the river has improved from the source to the Weija Reservoir. Figure 1 presents a graph of the WQI in 2005 and 2006.

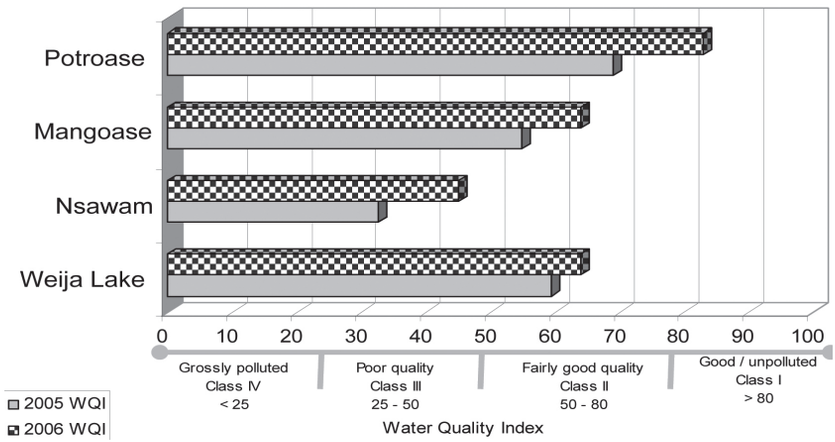

Figure 1. Water quality improvement in the Densu Basin

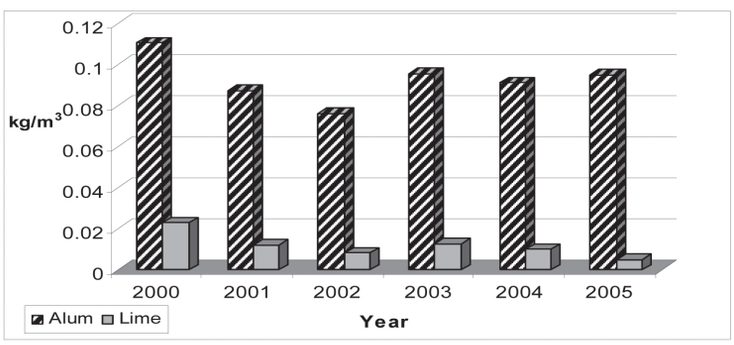

Figure 2. Reduction in Use of Alum and Lime in Water Treatment

A comparison of the results with data from Ghana Water Company Ltd. Indicated that the improvement of the quality of the water in the Weija Reservoir resulted in less chemical being used in the treatment of potable water (Fig. 2). Lime used for water treatment was reduced from 20g/m3 in 2000 to 4g/m3 in 2005, representing 80% in the reduction. In the case of alum the quantity used reduced remarkably from 96g/m3 in 2005.

Concluding remarks

The improvement of the water quality in the Densu River Basin is an indication that the activities implemented through IWRM are yielding results, and should be continued to sustain the gains made so far.

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