

Development of a community based management protocol for diffuse pollution control in agro-rural watersheds

Sibekile Mtetwa* and C Frederik Schutte

Department of Chemical Engineering, University of Pretoria, South Africa

Abstract

Water quality management is a very serious problem in the rural areas of developing countries. The main contribution to pollution of water sources in these areas is from diffuse sources, notably from subsistence farming. It is evident that water quality management would only be effective by changing the practices that contribute to diffuse pollution. This paper is based on a project that employed a systematic approach to involve and mobilise rural communities in water quality control programmes. The aim of the project is to develop methodologies that could be employed in rural areas to control the generation of diffuse pollution. The investigation is based on a pilot project in an agro-rural sub-watershed in a developing country. Stakeholder participation and technical control options were concurrently investigated in the development of a community based diffuse pollution management protocol that could be applied in rural areas with poorly developed local government structures.

Introduction

The implementation of pollution control measures and water quality management is extremely difficult in the rural areas of developing countries (Hoffman, 1994). The main contribution to pollution of water resources in these areas is from diffuse sources, notably from subsistence farming. Farming practices that contribute to water pollution include overgrazing, removal of trees and bushes for firewood, ploughing, tilling and cultivating on stream- and river banks and in wetlands, poor fertilizing practices, etc. It is evident that water quality management would only be effective by changing the practices that contribute to diffuse pollution.

The management of water resources in most Southern African countries has entered an exciting new phase. The respective governments are placing considerable emphasis on community involvement in resources management. This is because the current water quality problems have proved to be beyond the scope of technological solutions alone and require the involvement of all stakeholders including rural communities (Martin, 1991). The situation is even worse in terms of diffuse pollution because it is difficult to identify, isolate or control (Hoffman, 1994).

This paper is based on a pilot project in the Muda river catchment in Zimbabwe, aimed at developing a methodology for the management of diffuse pollution from an agro-rural watershed. It follows on an earlier paper by the same authors in which details of the catchment, farming practices and pollution loads are given (Mtetwa and Schutte, 2002). In this paper the focus is on the development of the protocol for diffuse pollution management.

The availability of methodologies for water quality management in rural areas has become very important and urgent in many countries in southern Africa where land reform processes are increasingly implemented and accelerated. Land reform has already resulted in large increases in the numbers of subsistence farmers

and in land area being used for this purpose. Urgent measures are therefore required to prevent or limit the potential negative effects of subsistence farming on the environment and specifically on water resources.

The methodology to manage and control diffuse pollution from rural agricultural activities was developed from the practical experience gained in the Muda project. The proposed methodology is based on lessons learnt during the project, on problems experienced and practical measures to overcome such problems. The basic premise has been to introduce community-based water management through environmentally sustainable agricultural practices.

In developed societies local government structures can be used both for service and social requirements delivery. Public sector funding and discharge permit trading are available for diffuse pollution management (Novotny, 1999). However for less developed societies local government structures are almost non-existent and people have to rely on community-based management for services (Van der Voorden, 2002). Community-based management approaches have been applied for operation, maintenance and management of water and sanitation systems where the communities derive direct and immediate benefits from such services. However, the benefits from water quality management are not obvious and communities therefore are not willing to invest therein (Schoeman, 1997).

A diffuse pollution management protocol was developed in an interactive manner with the community. A systems analysis approach was followed. This is a relatively complex process especially in a developing semi-arid region where resources are scarce and water quality is not a priority. Further complicating factors included volatile political activities that developed during the course of the project, a serious economic downturn and varying climatic conditions of very high rainfall during the first phases followed by a drought period.

It was accepted at the inception of the project that a technical approach and technical solutions would not be appropriate for the circumstances in a rural area such as the Muda catchment. It was decided that the technical aspects would be handled by the project team mainly to monitor the situation with respect to water quality, runoff, and stream flow. The focus of the project would be on the socio-economic aspects of creating awareness with the people of

* To whom all correspondence should be addressed.

Current address: Zimbabwe National Water Authority, Water Quality Section, PO Box CY 617, Causeway, Harare, Zimbabwe.

☎+263 4 793139; e-mail: mtetwa@utande.co.zw

Received 4 April 2002; accepted in revised form 16 October 2002.