

Obsolete pesticide contamination: a new type of water and soil pollution

The scale, intensity and rate of urbanization across the globe has caused significant environmental pollution and posed severe pressure on the natural resources. In Sudan, various human land-use processes have affected the natural ecosystem, especially pollution of soil and water. Pesticide contamination of soil and water has become a subject of nationwide importance because groundwater is used for drinking purposes by about 50% of the population in Sudan. This especially relates to the population inhabiting the agricultural areas where pesticides are most often used. It is estimated that about 95% of the population relies on groundwater for drinking purposes. Pesticides can reach water-bearing aquifers below ground from crop fields, seepage of contaminated surface water, accidental spills and leaks, improper disposal, and even through injection of waste material into wells. Permeable stores, careless disposal of containers, direct spraying and discharge of pesticides into watercourses are considered as point source of surface and groundwater contamination. With time, source can often be unambiguously assigned and it is difficult to assign this type of contamination to a specific irrigation project.

There are severe risks of having these chemicals in the environment particularly in case of intrusion into groundwater and entering the drinking water network. These pollutants could remain in the environment for decades, resulting in increased incidence of cancer, chronic kidney diseases, birth defects, learning disabilities, and immunological, behavioural, neurological and reproductive disorders in humans and animals. Sudan suffers from severe soil and water contamination problems which directly influence humans and other life forms. Environmental contamination with chemical pesticides (e.g. DDT and organophosphorus compounds), mainly in Gezira and White Nile States of Sudan, have increased over the years in diverse agricultural projects for crop production. It is well known that residents of these States are enduring a major catastrophe with contaminated drinking water. A

misguided decision was made in the last two decades to store pesticide stocks on the ground without considering their environmental impact. Such sites are characterized by the cracking of soil, thus releasing a strong stench and exposing the groundwater to high risk of contamination (Figure 1). Sometimes obsolete pesticides were kept in an open shed on the floor, which was clearly not designed for long-term storage. The drums got damaged and leaked an estimated 110,000 l of liquid endosulfan (a persistent organochlorine) into the soil. These sites were unmonitored and thus exposed to humans and livestock. Moreover, the powder contents of torn bags, cardboard boxes and empty drums littered the site close to residential communities. This resulted in a serious threat to inhabitants of White Nile and Gezira States, as most of the population depends on agriculture. The problems associated with this practice also aggravated due to improper monitoring system for the control of pollutants discharged into the groundwater. According to Residual Pesticide Laboratory at Crop Protection Research Center in Gezira State, the concentration of 2-4D, Aldrin, DDT, BHC and endosulfan was 540, 20, 30, 10 and 3 ppm in the soil, and 250, 10, 10, 4 and 2 ppm in drinking water respectively. These concentrations are considered toxic according to international standards of drinking

water. Beyond this, organochlorine residues of 261 and 204 ng ml⁻¹ were found in the blood stream of inhabitants in this region, especially around Gezira and White Nile irrigated projects. Also, Gezira State recorded highest levels of heptachlor epoxide (170 ng ml⁻¹) and γ -HCH (92 ng ml⁻¹), while the highest concentration of DDE (618 ng ml⁻¹) and dieldrin (82 ng ml⁻¹) were detected in the blood of people from White Nile state¹.

It is estimated that the residents and the environment will continue to be at risk as these problems persist without any measures in place to eradicate them and could be prove catastrophic. Although the most contaminated soil is usually excavated and then transported to hazardous waste dumping sites, this method is quite expensive, and does not ensure complete remediation of the polluted areas.

It is therefore necessary for the Government to find an effective pathway to control pesticides, especially in agriculture and remediation of the already affected areas. Current technologically approved approaches such as anaerobic bioremediation of chlorinated pesticide-contaminated soil which results in 80–90% removal of pesticide contamination can be implemented². Also, with focus on utilizing available environment-friendly technology, organic pesticide should be used instead of chemical ones.



Figure 1. Cracking of soil due to storage of pesticides³.

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3. United Nations Environment Programme, DEP/0816/GE, June 2007.

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