

# SUSTAINABLE DEVELOPMENT OF WATER RESOURCES, WATER SUPPLY AND ENVIRONMENTAL SANITATION

## **“The Role of Trees in the Bioremediation of Drinking Water –A Research experiment in Nawakkaduwa, Kalpitiya”**

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### **Introduction**

The land use planning promulgated by conventional agriculture includes among many other facets, the intensive use of agrochemicals, the monoculture of one or two crop species, the removal of all other vegetation, the introduction of new crop varieties and pressure on the land to support three cropping cycles.

The intensity of conventional agriculture in sensitive environments is rife with negative impacts. For instance, in many countries, ground water from shallow aquifers is used to supply potable water as well as for irrigating crops grown with the use of chemical fertilizers and pesticides. The leaching of these agrochemicals into the ground water table has had a significant impact on ground water quality. Few, if any studies on the leaching of agrochemicals have been undertaken in developing countries even though the use of both chemical fertilizers and pesticides are high. (L.R. Lawrence & D.S.P. Kurupparachi, 1986)

The **Kalpitiya Peninsula** that is located on the west coast of Sri Lanka is a good case in point. The climate is characterized by high temperatures throughout the year and an average annual rainfall of 800-900 mm that occurs only between October and January.

Sandy regosols occupy the central portion and a greater part of the elevated beach plain that is adjacent to the lagoon in the Kalpitiya Peninsula. The dune sands are mainly present on the seaward side of the beach plain. Of special significance is the underlying *Gyben-Herzberg* lens of fresh water that is present in the beach plains with a flat to gently undulating topography. This permits stable human settlement and agricultural production on this landscape even in the very dry environment (C.R. Panabokke, 1996).

Despite the dry environment that prevails in this region, the underlying shallow fresh water supplies have permitted viable coconut plantations as well as sustained human settlement. However, the past forty years has seen the intensive cultivation of seasonal high value crops such as chilies, onions, tobacco, potatoes, and other vegetables cultivated under lift irrigation from shallow wells. The fresh water lens is extensively pumped for irrigation and potable water supplies, and the recharge is from direct infiltration from rainfall and return irrigation flows. The development of the shallow aquifer has altered the natural flow regime and now ground water flow within the aquifer is dominated by the abstraction from the shallow irrigation wells. Ground water quality over large areas of the peninsula is good and is of the calcium bicarbonate type. However within the cultivated areas, ground water concentrations of nitrate, chloride and potassium are exceptionally high. The nitrate and chloride concentrations in cultivated areas were in the ranges of 10-15 mg of N/ L and 100-300 mg/ L respectively, whereas those in the uncultivated areas in the range of 0-2 mg of N/ L and 500-100 mg/ L respectively (L.R. Lawrence & D.S.P. Kurupparachi, 1986 *et. al*). There is a clear correlation seen between ground water quality and land-use.