

Phosphates

Phosphates are chemical compounds containing phosphorus. Phosphorus is a non-metallic element which is necessary for life and is found in rock as inorganic phosphates. As water runs over and through rocks it carries off small amounts of minerals such as calcium, magnesium, and phosphates. Inorganic phosphates are a plant nutrient and are taken in by plants with water and incorporated into organic phosphate compounds. Animals obtain their essential phosphorus from phosphates in water and plant material. Natural waters have a phosphorus concentration of approximately 0.02 mg/L which is a limiting factor for plant growth. On the other hand, large concentrations of this nutrient can accelerate plant growth.

Effects on Environment and Human Health

Phosphates enter waterways through manmade sources also. The addition of large quantities of phosphates to waterways accelerates algae and plant growth in natural waters; enhancing eutrophication and depleting the water body of oxygen. This can lead to fish kills and the degradation of habitat with loss of species. Large mats of algae can form and in severe cases can completely cover small lakes. As a result, water can become putrid from decaying organic matter. When the concentration of phosphates rises above 100 mg/liter the coagulation processes in drinking water treatment plants may be adversely affected. Manmade sources of phosphate include human sewage, agricultural run-off from crops, sewage from animal feedlots, pulp and paper industry, vegetable and fruit processing, chemical and fertilizer manufacturing, and detergents.

Remedial Measures

The precipitation of phosphates from wastewater can occur during different phases within the wastewater treatment process. Pre-precipitation, where the chemicals are added to raw wastewater in primary sedimentation facilities, removes the precipitated phosphates with the primary sludge. In co-precipitation, the chemicals are added during secondary treatment to the effluent from the primary sedimentation facilities; to the mixed liquor in the activated-sludge process; or to the effluent from a biological treatment process before secondary sedimentation. They are removed with the waste biological sludge. In post-precipitation, the chemicals are added to the effluent from secondary sedimentation facilities and are removed in separate sedimentation facilities or in effluent filters. An alternative, biotechnological, approach is that of 'Enhanced Biological Phosphate Removal' ('EBPR') which utilises the ability of some microorganisms to accumulate phosphate (as polyphosphate) in excess of their normal metabolic requirements.

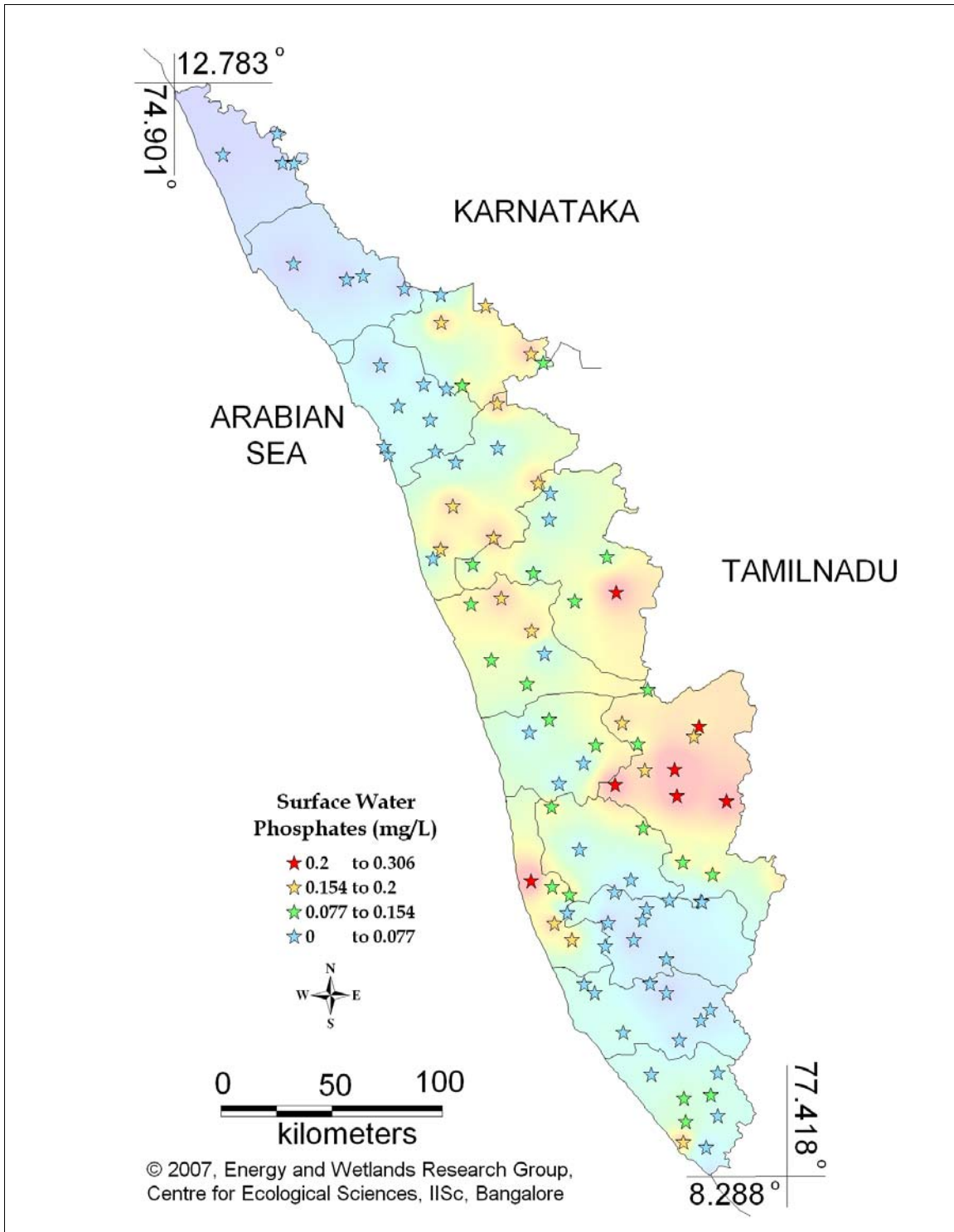
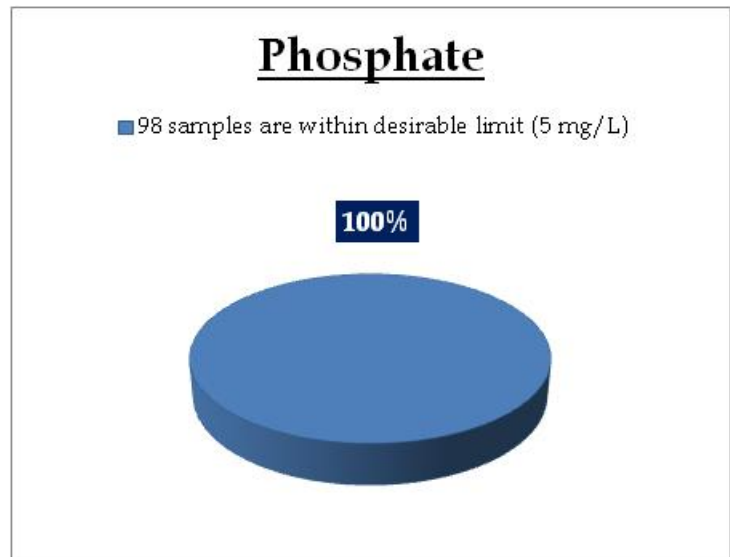


Figure 13.1: Spatial variation of phosphates in Kerala's surface water

Surface water - Phosphates

Tolerance limit for inland surface waters subject to pollution

Permissible Limit: 5 mg/L



Remarks

All the 98 surface water samples collected from rivers, streams and lakes spread over in Kerala are under the inland surface water standard.

Figure 13.2 : Spatial variation of phosphates in Kerala's well water

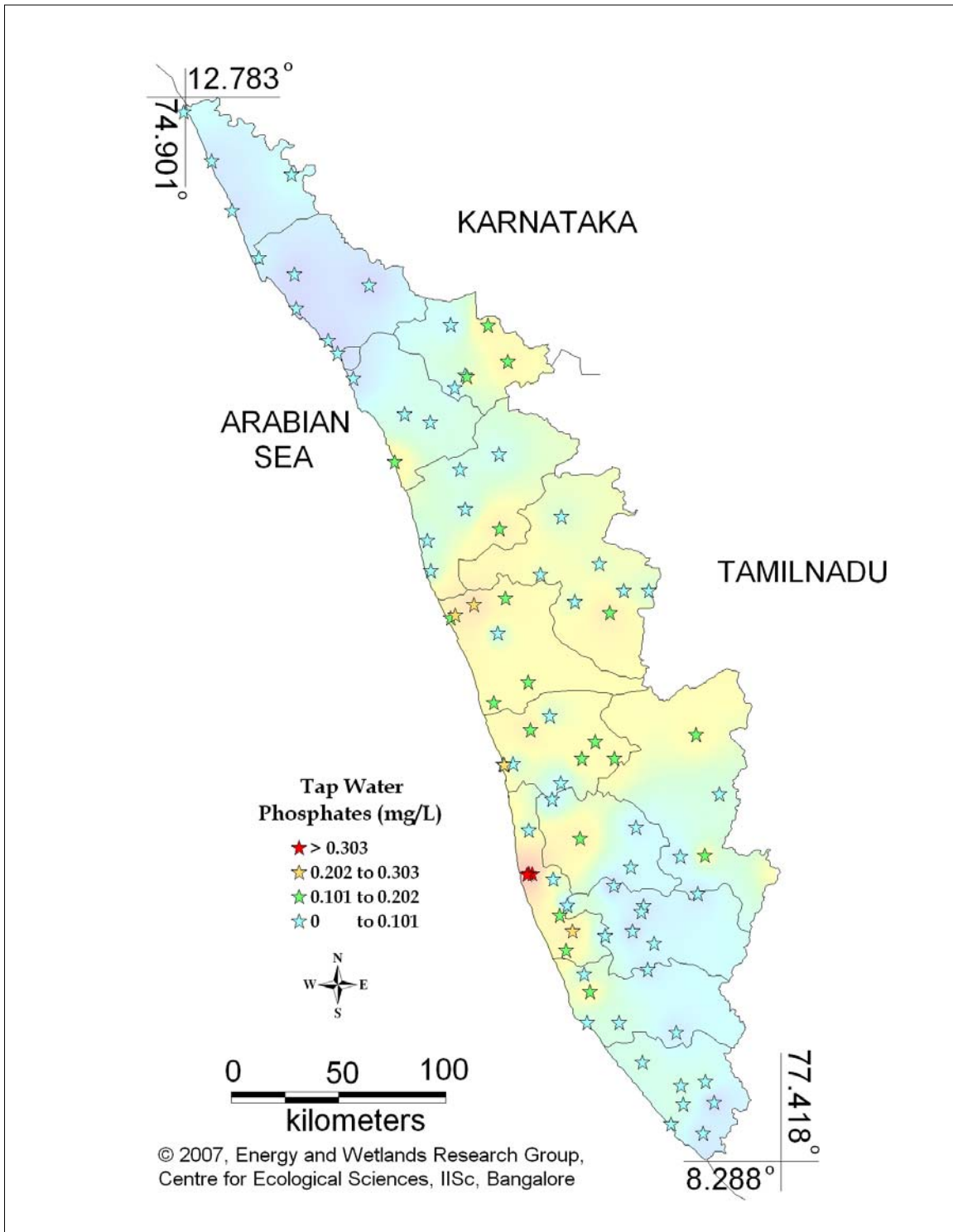


Figure 13.3: Spatial variation of phosphates in Kerala's tap water