

Alkalinity

Alkalinity refers to the capability of water to neutralize acid. This is really an expression of buffering capacity. A buffer is a solution to which an acid can be added without changing the concentration of available H^+ ions (without changing the pH) appreciably. It essentially absorbs the excess H^+ ions and protects the water body from fluctuations in pH. Alkalinity is often related to hardness because the main source of alkalinity is usually from carbonate rocks (limestone) which are mostly $CaCO_3$. If $CaCO_3$ actually accounts for most of the alkalinity, hardness in $CaCO_3$ is equal to alkalinity. Since hard water contains metal carbonates (mostly $CaCO_3$), it is high in alkalinity. Conversely, unless carbonate is associated with sodium or potassium which don't contribute to hardness, soft water usually has low alkalinity and little buffering capacity. So, generally, soft water is much more susceptible to fluctuations in pH from acid rains or acid contamination.

Effects on Environment and Human Health

Alkalinity is important for fish and aquatic life because it protects or buffers against rapid pH changes. Living organisms, especially aquatic life, function best in a pH range of 6.0 to 9.0. Alkalinity is a measure of how much acid can be added to a liquid without causing a large change in pH. Higher alkalinity levels in surface waters will buffer acid rain and other acid wastes and prevent pH changes that are harmful to aquatic life.

Remedial Measures

Alkalinity can be removed by reverse osmosis, along with other total dissolved solids. Other removal methods like distillation and deionization remove total dissolved solids and alkalinity, but they are less suitable for household use than reverse osmosis, but can be used at community level.

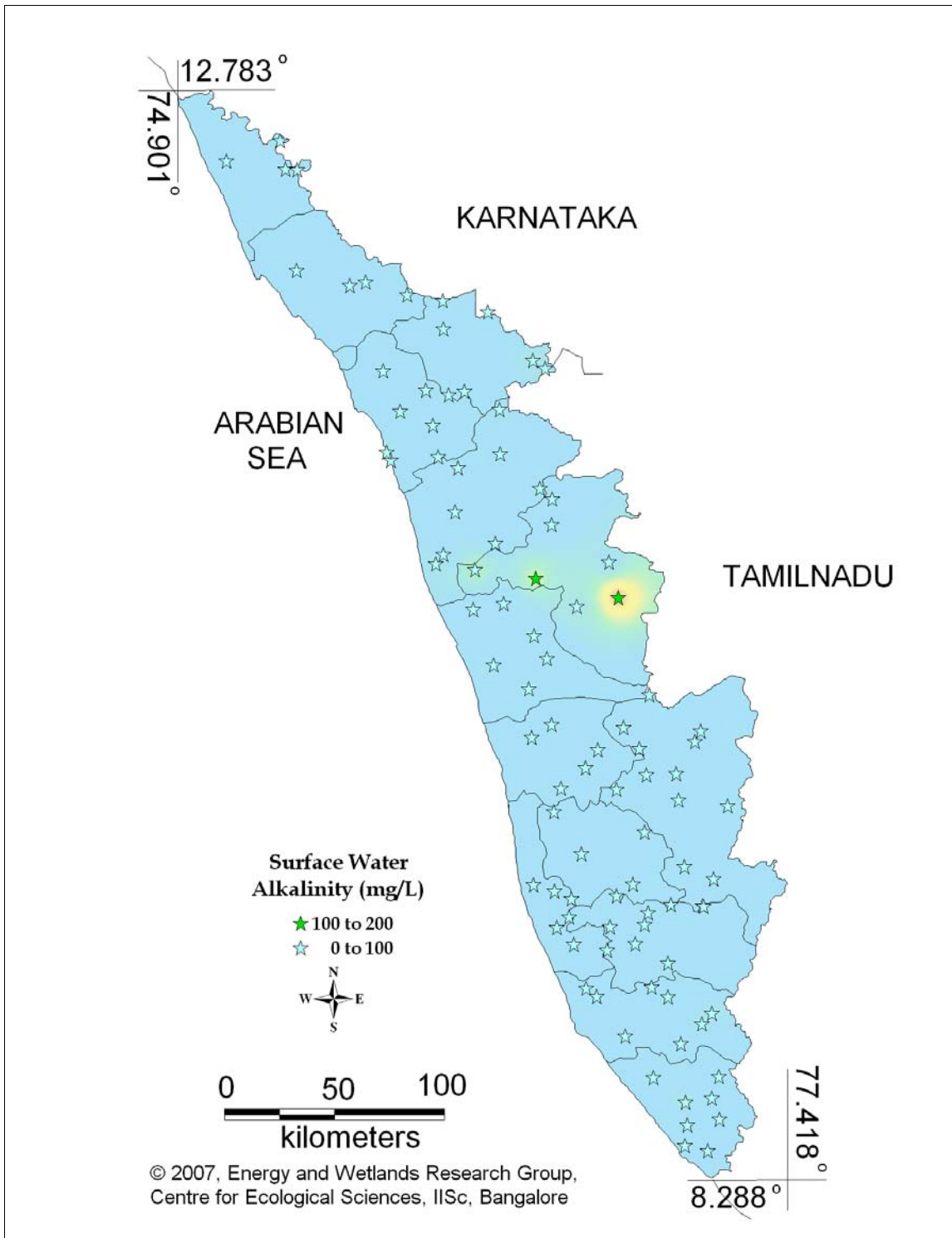


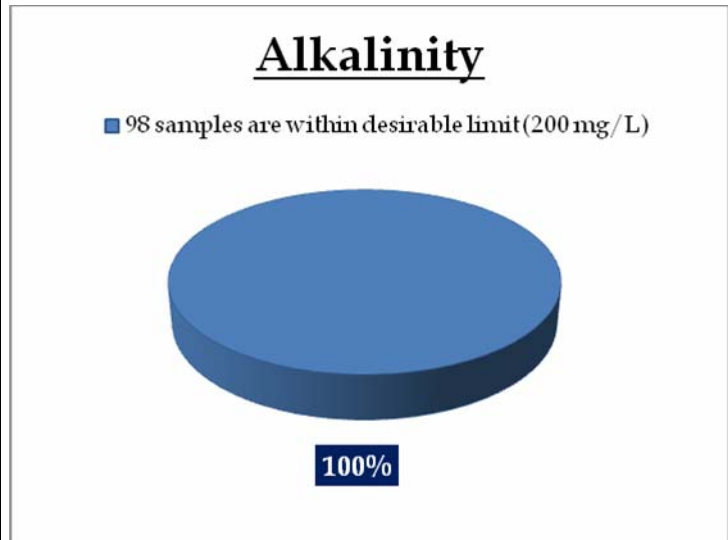
Figure 20.1: Spatial variation of alkalinity in Kerala's surface water

Surface water - Alkalinity

Tolerance limit for inland surface waters subject to pollution

Desirable Limit: 200 mg/L

Permissible Limit: 600 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.

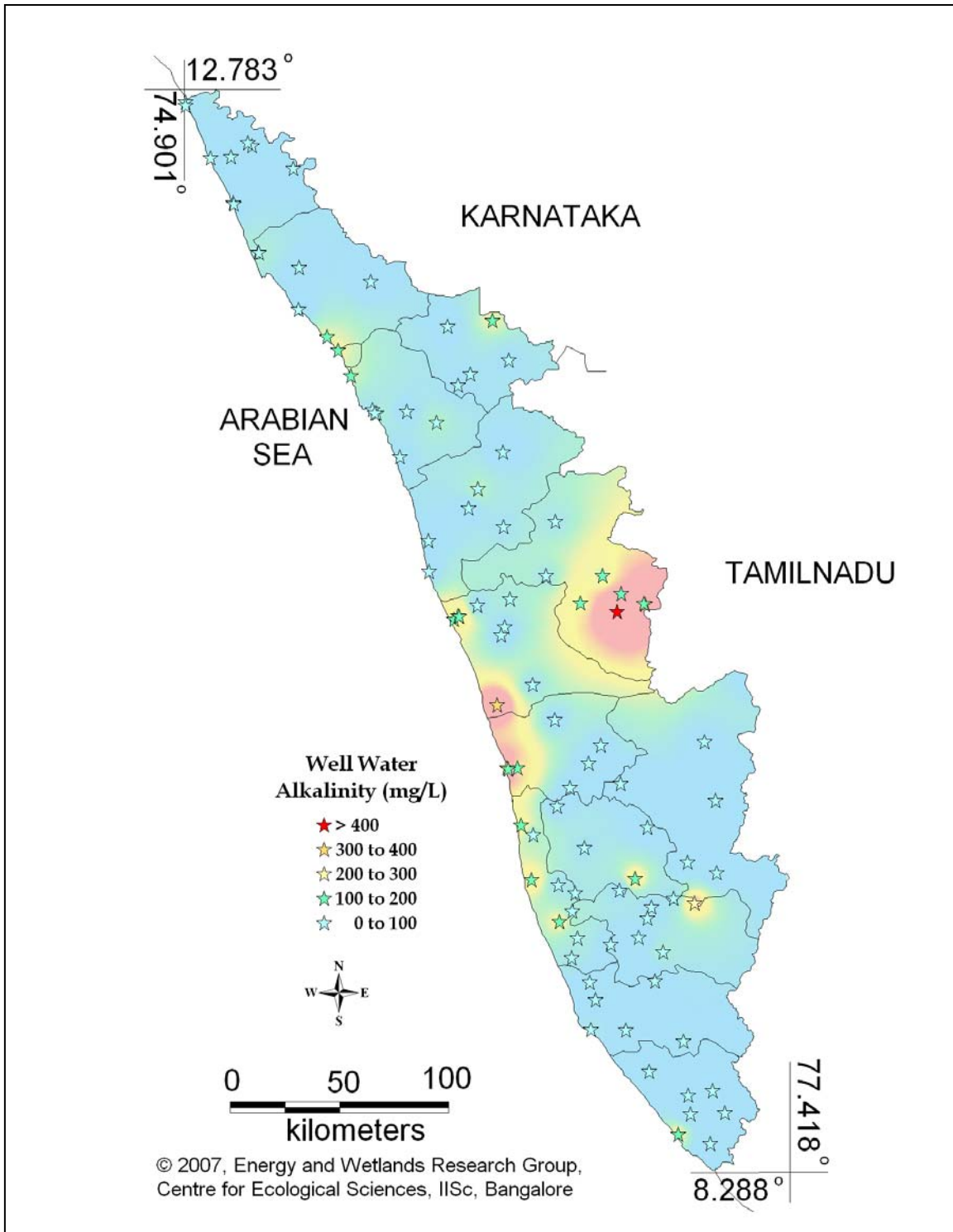


Figure 20.2: Spatial variation of alkalinity in Kerala's well water

Well water - Alkalinity

Standard for Drinking Water (BIS 105000)

Desirable Limit: 200 mg/L

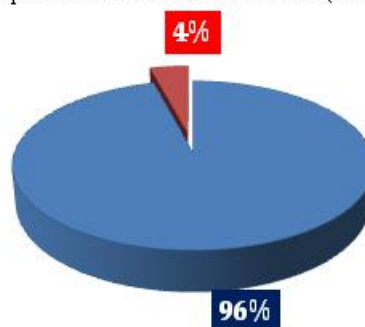
Permissible limit in the absence of an alternative source: 600mg/L

Beyond this limit taste becomes unpleasant.

Alkalinity

■ 94 samples are within desirable limit (200 mg/L)

■ 4 samples are above desirable limit (>200 mg/L)



Remarks

Sampling sites above desirable limit of Alkalinity are:

Location	Value	District
Attathodu East	200.00	Pathanamthitta
Koodungalur	304.00	Thrissur
Placimada	340.00	Palakkad
Fort Cochin	352.00	Ernakulam
Kollengode	408.00	Palakkad

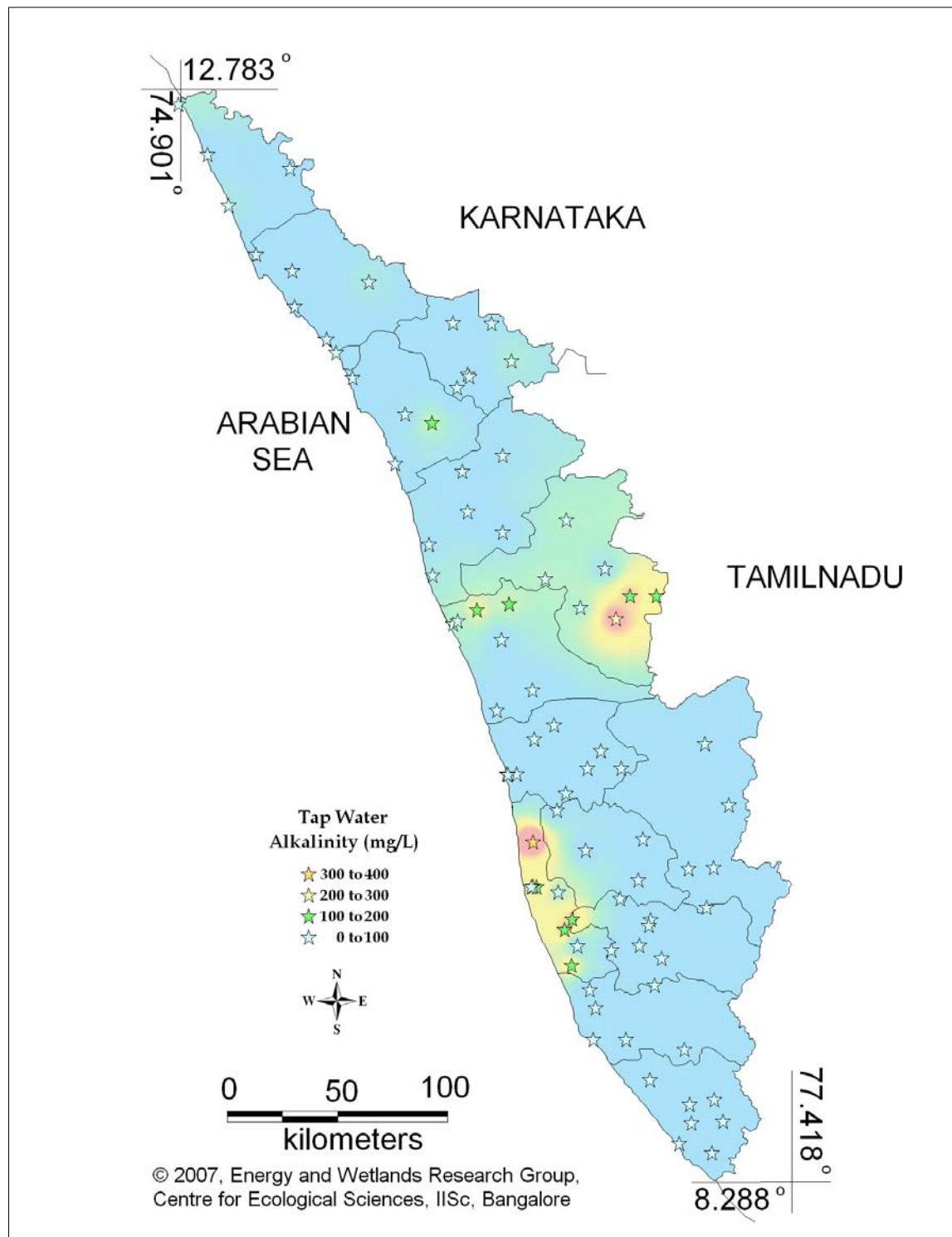


Figure 20.3: Spatial variation of Alkalinity in Kerala tap water

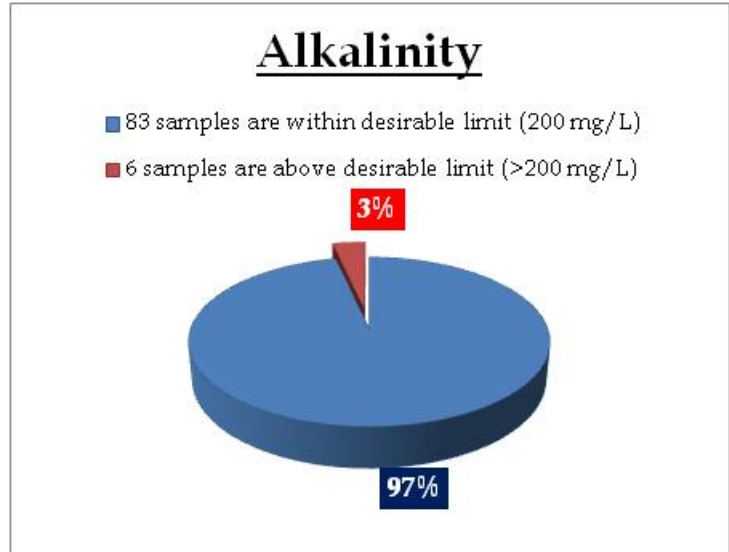
Tap water - Alkalinity

Standard for Drinking Water (BIS 105000)

Desirable Limit: 200 mg/L

Permissible limit in the absence of an alternative source: 600mg/L

Beyond this limit taste becomes unpleasant.



Remarks

Sampling sites above desirable limit of Alkalinity are:

Location	Value	District
Kollengode-Vellanara	228.00	Palakkad
Thathampally	232.00	Alappuzha
Kalikulam Junction	304.00	Alappuzha