

# Faecal Coliform Bacteria

Coliform bacteria include a wide range of aerobic and facultative anaerobic, Gram-negative, non-spore-forming bacilli capable of growing in the presence of relatively high concentrations of bile salts with the fermentation of lactose and production of acid or aldehyde within 24 h at 35–37 °C. *Escherichia coli* and thermotolerant coliforms are a subset of the total coliform group that can ferment lactose at higher temperatures. As part of lactose fermentation, total coliforms produce the enzyme  $\beta$ -galactosidase. Traditionally, coliform bacteria were regarded as belonging to the genera *Escherichia*, *Citrobacter*, *Klebsiella* and *Enterobacter*, but the group is more heterogeneous and includes a wider range of genera, such as *Serratia* and *Hafnia*. The total coliform group includes both Faecal and environmental species.

By testing for coliforms, especially the well known *E.coli*, which is a thermotolerant coliform, one can determine if the water has probably been exposed to faecal contamination; that is, whether it has come in contact with human or animal faeces. It is important to know this because many disease-causing organisms are transferred from human and animal faeces to water, from where they can be ingested by people and infect them.

## Effects on Environment and Human Health

Total coliforms should be absent immediately after disinfection, and the presence of these organisms indicates inadequate treatment. The presence of total coliforms in distribution systems and stored water supplies reveal regrowth and possible biofilm formation or contamination through ingress of foreign material, including soil or plants.

Large quantities of Faecal coliform bacteria in water may indicate a higher risk of pathogens being present in the water. Some waterborne pathogenic diseases include ear infections, dysentery, typhoid fever, viral and bacterial gastroenteritis, and hepatitis A. The presence of faecal coliform tends to affect humans more than it does aquatic creatures, though not exclusively.

## Remedial Measures

Faecal coliform, like other bacteria, can usually be killed by boiling water or by treating with chlorine. Washing thoroughly with soap after contact with contaminated water can also help prevent infections. Municipalities that maintain a public water supply should monitor and treat for Faecal coliforms.

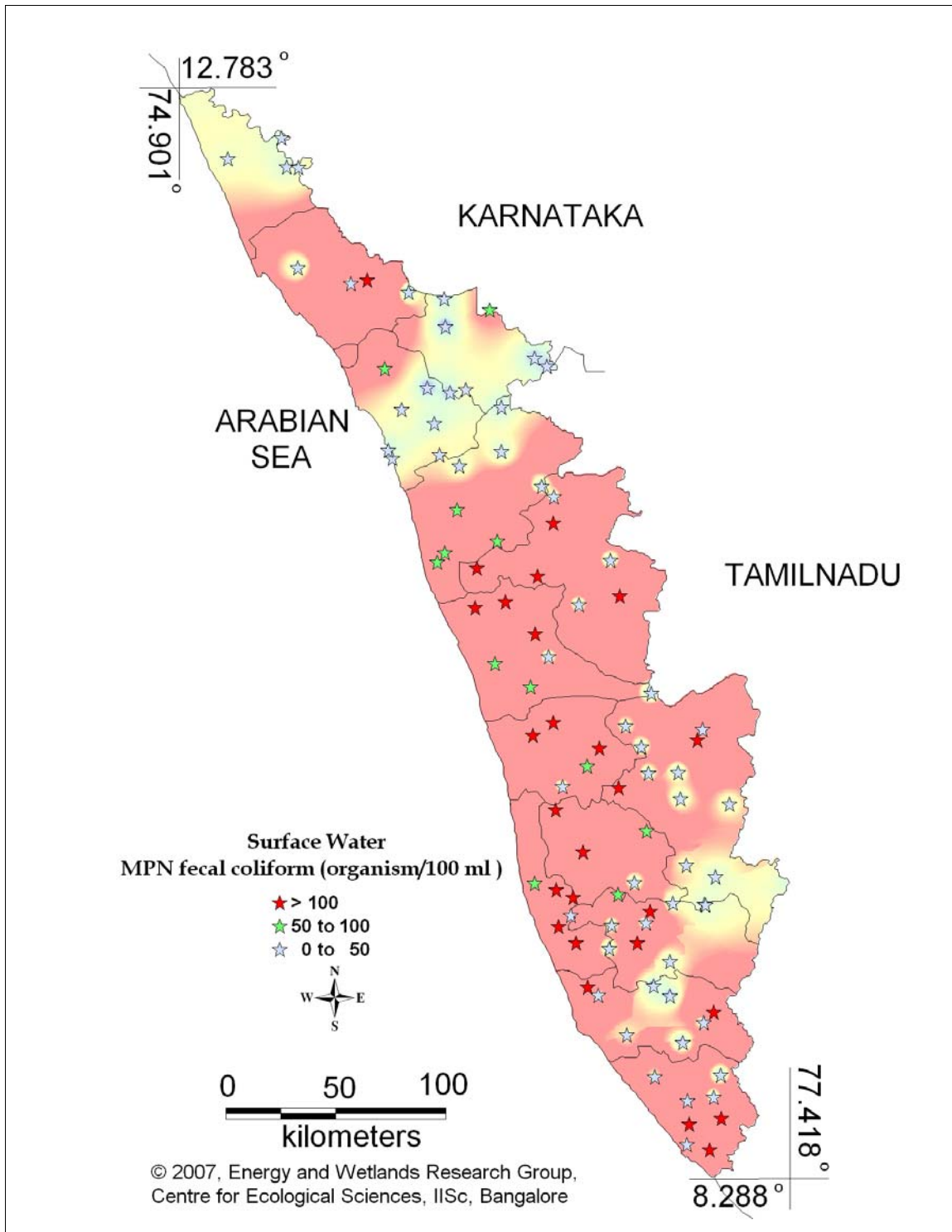


Figure 9.1: Spatial distribution of Faecal Coliform Bacteria in Kerala surface water

# Surface water – Faecal Coliform

For water entering a distribution system

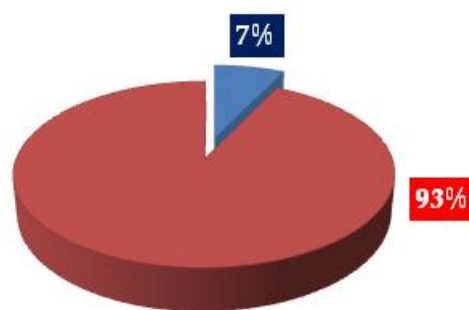
- ❖ Coliform count in any sample of 100 ml should be zero (0).

For water in a distribution system –

- ❖ *E coli* count in 100 ml of any sample must be zero (0).
- ❖ Coliform organisms should not be more than 10 per 100 ml in any sample.
- ❖ Coliform organisms should not be present in 100 ml of any two consecutive samples or more than 5% of the samples collected for the year.

## Fecal Coliform

- 7 samples are in desirable limit (0 organism/100 mL)
- 91 samples are above desirable limit (>0 organism/100 mL)



### Remarks

Sampling sites above desirable limit (organism/100ml) are listed ditricwise in Table 10.1 and the same is shown spatially in Figure 9.1

Table 10.1: Locations of Faecal Coliform Bacteria above desirable limit

Location	Value	District
Kallana aru	2	Kollam
Lekkidi-Vythri	2	Wayanad
Mukkadavu	2	Kollam
Munnar (8th mile)	2	Idukki
Perumpara Estate	2	Thirssur
Pidavoor	2	Kollam
Tirunelli	2	Wayanad
Vellayan	2	Tiruvanthapuram
Annakkayathumoola	4	Tiruvanthapuram
Kalar River	4	Kollam
Muthanga	4	Wayanad
Muthappankolli	4	Wayanad
Neduvannor Kadavu	4	Kollam
Pandalam	4	Pathinamthita
Thamarakulam lake	4	Kozhikode

Thommankuthu-Kaliyar	4	Idukki
Valikulam-Palapilly	4	Thirssur
Malampuzha	6	Palakkad
Moonnukalunkutodu	6	Idukki
Munddari	6	Malappuram
Pazhayidam	6	Kollam
Pambala-lower Periyar	7	Idukki
Azhuta River	8	Kottayam
Pamba-Aratukadavu	8	Pathinamthita
Chenkulathukavu	9	Kottayam
Koodathi	9	Kozhikode
Alathur	11	Palakkad
Nilambur-Chaliyar	11	Malappuram
Panathur	11	Kasarkod
Aranmula Sathrakadavu	12	Pathinamthita
Cheruthoni	12	Idukki
Jaloor	12	Kasarkod
Kakkad	12	Ernakulam
Vallakadavu	12	Idukki
Achankoil River	14	Pathinamthita
Karimbam-Taliparamba	17	Kannur
Kuttampuzha	17	Idukki
Pamba-Njunungar	17	Pathinamthita
Puthalam	17	Malapuram
Sabrimala-Pamba	21	Pathinamthita
Thannimoodu - Kallar	21	Idukki
Mananchira lake	22	Kozhikode
Bavikara-Chandragiripuzha	23	Kasarkod
Ellukachi-Karika	26	Kasarkod
Pookod Lake	26	Wayanad
Azhuta River-Idukki	27	Idukki
Manjappalam	27	Kozhikode
Avananvancherri	33	Tiruvanthapuram
Chenkulam	33	Kollam
Nedumangadu	33	Thiruvananthapuram
Sasthamkotta Lake	33	Kollam
Koolimadu	34	Kozhikode
Ezhuvathruthy-Nariooarambu	50	Malappuram
Muvathupuzha	50	Ernakulam
Pallipadi	50	Malapuram
Karuvannurpuzha	60	Malappuram
Kudapuzha	60	Thirssur
Kulathurmozhi	60	Kottayam

Kuppapuram	60	Alapuzha
Malapuram-Chamakayam	60	Malapuram
Marakadavu	60	Wyanad
Vadakara-Koorangottukataavu	60	Kozhikode
Kattupara	80	Malapuram
Adukkam	90	Kottayam
Cherananllur	110	Thirssur
Kavalam-Kuttanadu	110	Alapuzha
Nallathanni	110	Idukki
Vettikattumukku	110	Kottayam
Wadakancheery	110	Thirssur
Kallarakadvu	140	Pathinamthita
Kandiyoor	140	Alappuzha
Malumelkadavu	140	Kollam
Veeyapuram	140	Alappuzha
Athikayam	170	Pathinamthita
Kaladi	170	Ernakulam
Kalikadu	170	Tiruvanthapuram
Kothamangalam-Kozhipalli	170	Ernakulam
Kundamankadavu	170	Thiruvananthapuram
Ottapalam	280	Palakkad
Thirthala	280	Palakkad
Peechi Dam	300	Thirssur
Kazhuthruthy	350	Kollam
Poovathummuddu	350	Kottayam
Puzhapalam - Chitturpuzha	350	Palakkad
Thodupuzha	500	Idukki
Changanacherry	900	Kottayam
Irriti	900	Kannur
Mannarkad-Kunthipuzha	900	Palakkad
Munnar - Marayyr Rd	900	Idukki
Aluva	1600	Ernakulam
Neyyar	1600	Thiruvananthapuram

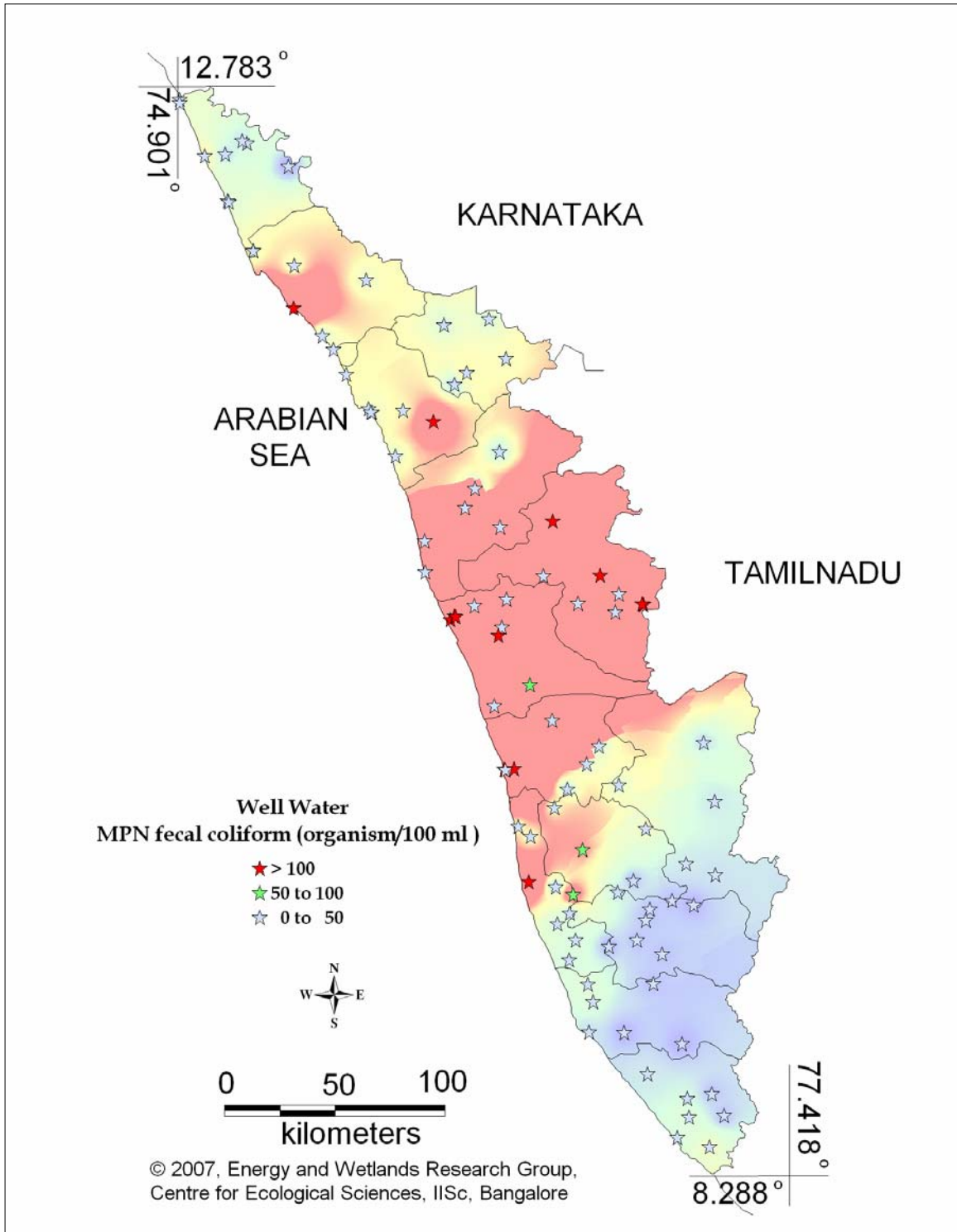


Figure 9.2: Spatial distribution of Faecal Coliform Bacteria in Kerala well water

# Well water - Coliform (MPN)

For water entering a distribution system

- ❖ Coliform count in any sample of 100 ml should be zero (0).

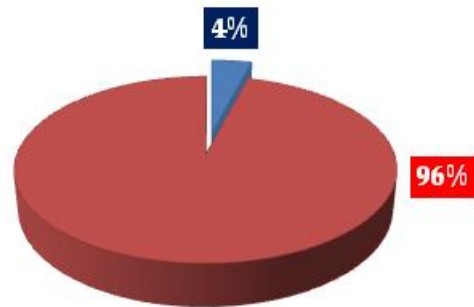
For water in a distribution system -

- ❖ *E coli* count in 100 ml of any sample must be zero (0).
- ❖ Coliform organisms should not be more than 10 per 100 ml in any sample.

Coliform organisms should not be present in 100 ml of any two consecutive samples or more than 5% of the samples collected for the year.

## Fecal Coliform

- 4 samples are in desirable limit (0 organism/100 mL)
- 94 samples are above desirable limit (>0 organism/100 mL)



### Remarks

Sampling sites above desirable are listed districtwise in Table 10.2

**Table 10.2:** Locations of Faecal Coliform Bacteria above desirable limit

Location	Value	District
Athikayam	2	Pathinamthita
Boudermukku	2	Thiruvananthapuram
Kallarakadvu	2	Pathinamthita
Kallely Check Post	2	Pathinamthita
Neyyar Dam	2	Thiruvananthapuram
Pampa Valley	2	Pathinamthita
Pazhayidam	2	Kottayam
Pidavoor	2	Kollam
Vadaserikara	2	Pathinamthita
Vaithiri	2	Wayanad
Bengathadka	4	Kasaragod
Bovikanam	4	Kasaragod
Chenkulathukavu	4	Kottayam
Manjeri	4	Malappuram
Nilambur	4	Malappuram
Onakkoor-Piravam	4	Ernakulam

Kattachal	6	Kollam
Kochupilammood	6	Kollam
Kulathurmozhi	6	Kottayam
Old Munnar	6	Idukki
Vallakadavu	6	Idukki
Avananvancherri	7	Thiruvananthapuram
Peeramedu	7	Idukki
Thannimoodu	7	Idukki
Kandiyoor	9	Alapuzha
Kayamkulam	9	Alapuzha
Nedumangadu	9	Thiruvananthapuram
Veeyapuram	9	Alapuzha
Thiruvallam	11	Thiruvananthapuram
Adhur	12	Kasaragod
Kallummoottilkadavu	12	Kollam
Kanhangad	12	Kasaragod
Kothamangalam	12	Ernakulam
Mattancherry	12	Ernakulam
Muvathupuzha	12	Ernakulam
Payyanoor	12	Kannur
Thalassery	12	Kannur
Chatakadavu	13	Wayanad
Alathoor -WYD	14	Wayanad
Alathur	14	palakkad
Kulasekaram	14	Thiruvananthapuram
Malumelkadavu	14	Kollam
Tirur	14	Malappuram
Aaviyal	17	Kasaragod
Hosabettu - Manjeshwar	17	Kasaragod
Kottooli	17	Kozhikode
Koyilandy-	17	Kozhikode
Kothamangalam		
Thodupuzha	17	Idukki
Adukkam	22	Kottayam
Irriti	22	Kannur
Mahe	22	Puduchery
Neyyathinkara	22	Thiruvananthapuram
Poorot	22	Kasaragod
Karimbam-Taliparamba	23	Kasaragod
Ponnani	23	Malappuram
Kalikulam Junction	26	Alapuzha
Kavalam	26	Alapuzha
Kollengode	26	palakkad



Koodungalur	26	Thrissur
Koyilandy	26	Kozhikode
Puzhapalam	26	palakkad
Sulthan Bathery	26	Wayanad
Thrissur	26	Thrissur
Vettakkal Junction	26	Alapuzha
Wadakancheery	26	Thrissur
Koyilandy	27	Kozhikode
Vettikattumukku	27	Kottayam
Balusserry - Vaikundam	30	Kozhikode
Kaladi	30	Ernakulam
Malappuram-Kottakunne	30	Malappuram
Vadakara	30	Kozhikode
Chemnad	33	Kasaragod
Cherananllur	33	Thrissur
Kalpetta - Rattakoli	33	Wayanad
Ottapalam	34	palakkad
Perinthalmanna	34	Malappuram
Payyanoor	40	Kasaragod
Chalakydy	50	Thrissur
Poovathummuddu	50	Kottayam
Thuruthelpalam	80	Kottayam
Guruvayoor	110	Thrissur
Kannimari	110	palakkad
Karingalmanna	110	Kozhikode
Placimada	110	palakkad
Mullackal-Azhapuzha	140	Alapuzha
Guruvayoor1	240	Thrissur
Kannur	280	Kannur
Chavakkad	300	Thissur
Thondikulam Agraharam	350	palakkad
Ernakulam	500	Ernakulam
Fort Cochin	500	Ernakulam
Mannarkkad	500	palakkad
Aluva	900	Ernakulam
Thrissur	>1600	Thrissur

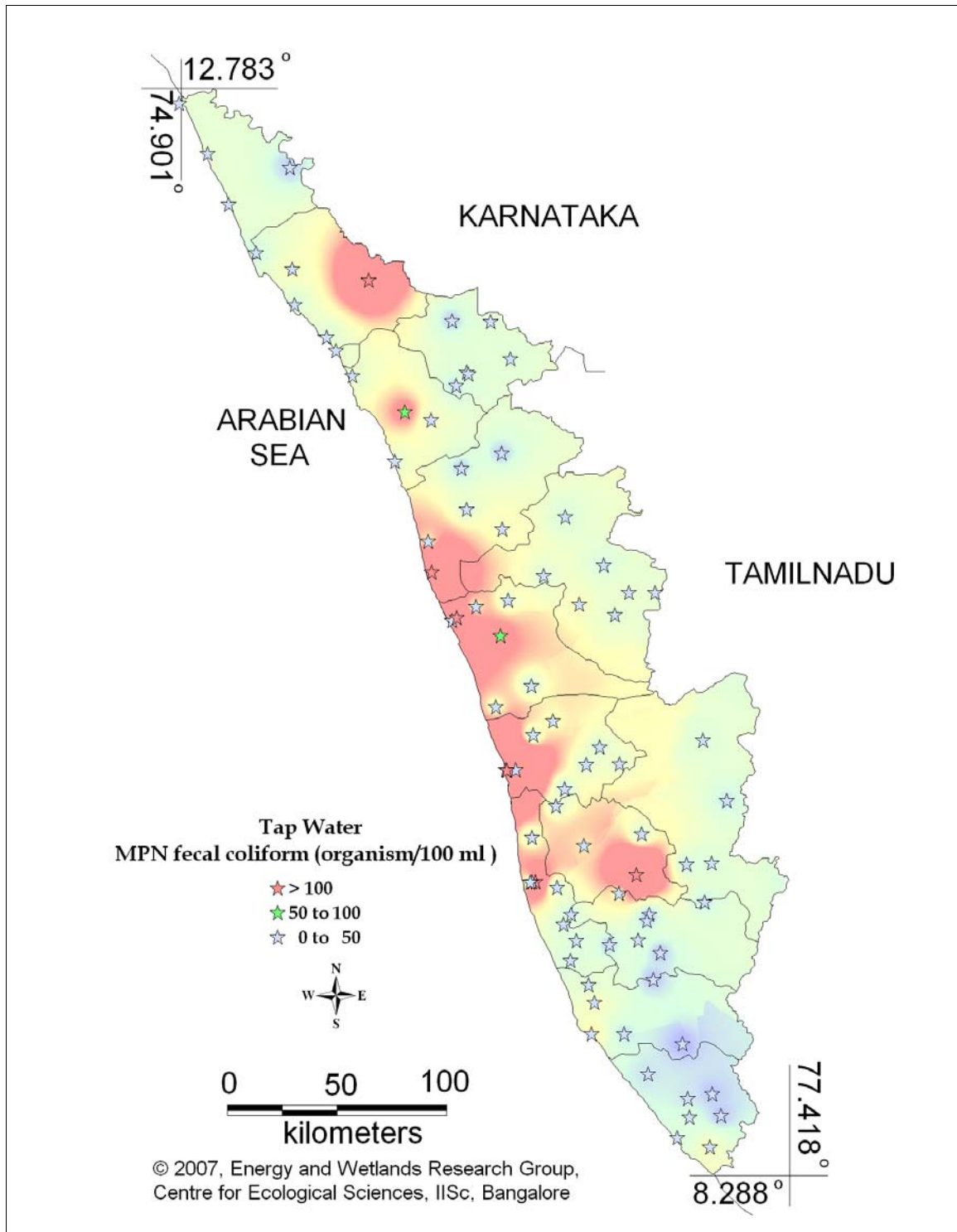


Figure 9.3: Spatial distribution of Faecal Coliform Bacteria in Kerala tap water

# Tap water -Coliform (MPN)

For water entering a distribution system

- ❖ Coliform count in any sample of 100 ml should be zero (0).

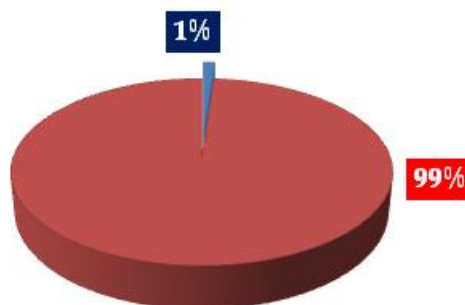
For water in a distribution system -

- ❖ *E coli* count in 100 ml of any sample must be zero (0).
- ❖ Coliform organisms should not be more than 10 per 100 ml in any sample.

Coliform organisms should not be present in 100 ml of any two consecutive samples or more than 5% of the samples collected for the year.

## Fecal Coliform

- 1 sample is in desirable limit (0 organism/100 mL)
- 85 samples are above desirable limit (>0 organism/100 mL)



### Remarks

Sampling sites above desirable limit (organism/100ml) are listed districtwise in Table 10.3

Table 10.3: Locations of Faecal Coliform Bacteria above desirable limit

Location	Value	District
Adithippuzha	2	Pathinamthita
Boudermukku	2	Thiruvananthapuram
Kalikadu	2	Thiruvananthapuram
Kallely	2	Pathinamthita
Pandalam	2	Kasaragod
Pathanapuram pump house	2	Kottayam
Vadaserikara	2	Pathinamthita
Kakkad	4	Ernakulam
Kilikkallungal	4	Malapuram
Kodayangadi-Mananthavadi	4	Wayanad
Nilambur	4	Malapuram
Ponathur	4	Kasaragod
Vaithiri	4	Wayanad
Avananvancherri	6	Thiruvananthapuram
Chenkulathukavu	6	Kottayam
Kavalam-Kuttanadu	6	Alappuzha
Kummallor	6	Kollam

Nedumangadu	6	Thiruvananthapuram
Pamba-Triveni	6	Pathinamthita
Pazhavangadi Jn-Aazhapuzha	6	Kannur
Nedumkandam	7	Thiruvananthapuram
Peeramedu	7	Alappuzha
Akathethara	9	Palakkad
Kandiyoor	9	Alappuzha
Kayamkulam	9	Alappuzha
Payyanoor	9	Pathinamthita
Thathampally	9	Alapuzhala
Kakki Junction	11	Alappuzha
Kallarakadvu	11	Pathinamthita
Kulasekaram	11	Thiruvananthapuram
Parayilkaling	11	Pathinamthita
Thenkara	11	palakkad
Aluva	12	Ernakulam
Chalakydy	12	Thrissur
Kothamangalam	12	Ernakulam
Muvathupuzha	12	Ernakulam
Pallikunnu - Kannur	12	Kannur
Thalassery	12	Kannur
Theekoy	12	Kottayam
Thiruvallam	12	Thiruvananthapuram
Veeyapuram	12	Alapuzhala
Munnar Town	13	Idukki
Alathoor -WYD	14	Wayanad
Kalpetta - Rattakoli	14	Wayanad
Kalpetta	14	Wayanad
Malappuram-Kottakunne	14	Malapuram
Malumelkadavu	14	Kollam
Ottapalam	14	Palakkad
Sultan Battery	14	Wayanad
Chittur	17	Palakkad
Kalikulam Junction	17	Alappuzha
Kanhangod	17	Kasaragod
Kasargod	17	Kasaragod
Kollengode-Vellanara	17	Palakkad
Mahe	17	Puducherry
Moonkilmada	17	Palakkad
Pokki-Manjeshwar	17	Kottayam
South Beach - Calicut	17	Kozhikode
Thodupuzha	17	Idukki
Vadakara	17	Kozhikode

Wadakancheery	17	Thrissur
Thamarassery	21	Kozhikode
Alathur	26	Palakkad
Cholomkunnu	26	Malapuram
Kaladi	26	Ernakulam
Kallummoottilkadavu	26	Kollam
Koodungalur	26	Thrissur
Neyyathinkara	26	Thiruvananthapuram
Talipparamba	26	Kannur
Kulathurmozhi	27	Kottayam
Chavakkad	33	Thirssur
Cherananllur	33	Thirssur
Ernakulam	33	Ernakulam
Kollam Beach	34	Kollam
Perror	34	Idukki
Tirur	34	Malapuram
Balusserry - Vaikundam	60	Kozhikode
Thrissur	60	Thrissur
Guruvayoor	110	Thrissur
Iriti	140	Kannur
Kuppapuram	170	Alappuzha
Ponnani	240	Malapuram
Chirakadavu	280	Kottayam
Fort Cochin	300	Ernakulam
Shastiparambu	350	Ernakulam