

IMPACT OF RAINFALL ON BEACH WATER QUALITY

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Abstract

The microbiological quality of sea water at the mouth of seven small rivers of a Greek island was investigated over a twelve month period. After rain incidents the bacterial indicator concentrations, which were normally below European Union Standards, were elevated above the limits. The finding suggests that extra precautions should be taken after storm events by managers of recreational coastal areas in the vicinity of rivers or dry gulleys, in order to avoid public health problems associated with swimming in polluted seawater.

Keywords : Coastal Waters, Monitoring, Sewage Pollution.

In countries like Greece, with a shortage of extended coastal sand deposits, mouths of small rivers and dry gulleys offer sandy beaches suitable for bathing and recreation. The microbial quality of bathing water is routinely investigated in European Union countries by bimonthly sampling from May to October, according to legislation [1]. Sampling is not required after storm events. On the other hand storm water is known to cause deterioration of the microbial quality of coastal waters, by carrying into the sea micro organisms collected from running over land in the river basin [2,3,4]. The aim of this study was to investigate the effect of sporadic rain events on the microbiological quality of coastal waters normally complying with EU requirements.

Seven sampling stations, located at the mouths of small rivers and dry gulleys on the eastern coast of the island of Lesbos, Greece, were sampled at monthly intervals for a twelve month period. Samples were carried to the laboratory in ice boxes and processed within four hours of collection. Microbiological tests were performed according to Standard Methods and included cultures for total coliforms (TC), faecal coliforms (FC) and enterococci (Ent). The levels of the three faecal pollution indicators (TC,FC,Ent) in the seawater, in all seven stations, were assessed in dry weather to be below the limits set by the EU legislation regarding the quality of bathing waters. These levels were exceeded when sampling was initiated after a storm event. The amount of precipitation (measured in mm/24h preceding sampling) associated with elevated indicator concentrations.

relationships between indicators, pathogens and water quality in an estuarine system. *Water Research*, 30, 2045-2054.

Tab. 1. Faecal indicator concentrations detected in coastal waters at the mouths of seven small rivers and dry gulleys after precipitation events.

Rain /24h		TC/100ml median	FC/100ml median	Ent/100ml median
36.5 mm	(April)	2.4×10^3	5.6×10^2	$>10 \times 10^4$
2.0 mm	(May)	9.0×10	4.3×10	1.4×10
1.3 mm	(December)	$>10 \times 10^4$	1.0×10^2	1.9×10^2
0.7 mm	(November)	9.5×10	1.1×10	2.0×10
0.1 mm	(March)	1.4×10	5.8×10	5.7×10

Rain is not uncommon in the Mediterranean countries during the bathing season. Even the strict sampling demands of the European Union Directive concerning the quality of bathing waters [1], do not require sampling after incidents of rain. The results of our study indicate that in the Mediterranean region, too, as in North America and Australia [2,3,4], rain causes severe deterioration of recreational water quality in the vicinity of mouths of even small rivers (point sources). This is a fact that should not be ignored by those managing coastal recreational areas.

References

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