

Spatial and temporal variations of river water quality using multivariate statistical techniques

Hassan M.A. Alssgeer^{a,b}, Mohd Khairul Amri Kamarudin^{a,c,*}, Mohd Armi Abu Samah^d, Mohd Ekhwan Toriman^e, Muhammad Barzani Gasim^a, Marlia M. Hanafiah^f, Laila O.M. Alubyad^a, Ahmad Shakir Mohd Saudi^g, Khairul Nizam Maulud^h, Noorjima Abd Wahab^a, Siti Nor Aisyah Bati^a, Mohamed Erhayem^b

^aEast Coast Environmental Research Institute (ESERI), University Sultan Zainal Abidin, Gong Badak Campus, 21300 Kuala Nerus, Terengganu, Malaysia, email: mkhairulamri@unisza.edu.my (M.K.A. Kamarudin) ^bChemistry Department, Faculty of Science, Sebha University, Sebha, Libya

^cFaculty of Applied Social Science, Universiti Sultan Zainal Abidin, Gong Badak Campus, 21300 Terengganu, Malaysia ^dKulliyyah of Science, International Islamic University Malaysia, Jalan Sultan Ahmad Shah, Bandar Indera Mahkota, 25200 Kuantan, Pahang, Malaysia

^eFaculty of Social Sciences and Humanities, Universiti Kebangsaan Malaysia, 43600 Bangi, Selangor, Malaysia ^fCenter for Earth Sciences and Environment, Faculty of Science and Technology, Universiti Kebangsaan Malaysia, 43600 Bangi, Selangor, Malaysia

^sInstitute of Medical Science Technology, Universiti Kuala Lumpur, 43000 Kajang, Selangor, Malaysia ^hEarth Observation Center, Institute of Climate Change, Universiti Kebangsaan Malaysia, 43600 Bangi, Selangor, Malaysia

Received 21 May 2022; Accepted 22 July 2022

ABSTRACT

The assessment of temporal/spatial variability and the interpretation of large and complex datasets of water quality were performed using multivariate statistical techniques such as cluster analysis (CA) and factor analysis (FA). Water quality of the Nerus River for 27 parameters was monitored at eight sampling stations. Three different similarity groups between sampling sites that reflected different water quality parameters were identified by the CA, while the FA/principal component analysis has determined nine factors responsible for the data structure that account for 82.24% of the total variance of the dataset. 14 parameters are needed to explain 82.24% of water quality changes for both temporal and spatial, hence the significant data reduction was not achieved. The findings suggested the compulsion and effectiveness of environmental techniques for interpretation of large datasets are targeting to gain information about water quality using temporal and spatial characterizations at the designated water monitoring stations in the river.

Keywords: Spatial and temporal assessment; Water quality; River water; Nerus River basin; Multivariate analysis

* Corresponding author.