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The need for proper management leading to the sustainability of the Kelani River and its lower basin

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Abstract and figures

The Kelani River is the second largest watershed in Sri Lanka and the main water-supply intake point for the Greater Colombo. The present study focuses to identify the sources of pollutants of the meandering zone of the Kelani River, particularly due to the absence of more recent information. Accordingly, a survey was conducted to obtain information on industrial discharges, anthropological, and social activities within the area of 15m from left and right banks of the river. The high contaminations (total and faecal coliform – 1100 MPN·(100 cm⁻³) –1; COD – 10 mg·dm⁻³; BOD – 4 mg·dm⁻³) of surface and groundwater are corroborated with the results obtained via the demographic and land usage statistics. Industrial pollutant sources and harmful anthropological practices were identified as major threats to the river basin. In this survey, agriculture and land degradation were identified as issues due to improper land

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The need for proper management leading to the sustainability of the Kelani River and its lower basin

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Abstract

The Kelani River is the second largest watershed in Sri Lanka and the main water-supply source for Colombo. The present study focuses to identify the sources of pollutants of the meandering river particularly due to the absence of more recent information. Accordingly, a survey was conducted to identify industrial discharges, anthropological, and social activities within the area of 15 m from left and right banks and high contaminations (total and faecal coliform – $1100 \text{ MPN} \cdot (100 \text{ cm}^3)^{-1}$; COD – $10 \text{ mg} \cdot \text{dm}^{-3}$; TSS – $10 \text{ mg} \cdot \text{dm}^{-3}$) and groundwater are corroborated with the results obtained via the demographic and land use survey. Significant pollutant sources and harmful anthropological practices were identified as major threats to the river's health. Land degradation was identified as an issue due to improper land use management. Based on the results of the study, it was identified that the awareness for Kelani River protection and evaluation of the Kelani River basin under a management plan should be implemented. Private partnerships contribution to the sustainability of the Kelani River basin should be established.

Key words: *the Kelani River basin, lower river basin, pollution sources, proper management, sustainability*

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ever-increasing sewage flows. Also, more and more water will be required for environmental concerns such as aquatic life, wildlife refuges, recreation, scenic values, and riparian habitats. This will require intensive management and sustainability of surface and groundwater as depletion

chemical substances in aquatic changes in the structure and community, i.e. on biotic in physico-chemical aggressions and groundwater due to conta

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found deterioration in the quality of the resource and constitute in itself a real health hazard for consumers. The need to set up a monitoring system for the quality of surface water and groundwater is becoming a real object of research with a view to achieve integrated management of resources and maintain the sustainability of water points and their watershed.

The Kelani River is one of the main rivers in Sri Lanka and it is starting from Nallathanniya (about 2200 m above mean sea level) which locates in the central highlands in the country and flows via Kithulgala, Avissawella through flood plains ending with the Colombo at Mattakkuliya into the Indian Ocean. However, since the river flows through the urban centers, farmlands, and industrial zones, it is more vulnerable to water pollution [MAHAGAMAGE *et al.* 2016a; MAHAGAMAGE, MANAGE 2014; 2015].

The Kelani River basin is home for more than 20% of the Sri Lankan population and among them, 60% rural, 32% urban, and 8% are estate communities, and the river provides around 80% of water required to greater Colombo as well [MAHAGAMAGE, MANAGE 2018]. The urban population in the Kelani River basin is the highest among the other river basins considered [DHI 1999]. Further, the Kelani River basin supports socio-economic activities such as agriculture, hydropower generation, sand mining, and gem mining, urban development, industrial development, tourism and power generation, recreational, fisheries, transportation, etc. [MAHAGAMAGE, MANAGE 2014]. Therefore, the Kelani River is known for its increasing pollution as a result of industrial discharges, poor local authority service delivery, weak environment management, and governance [AREWGODA 1986; CEA 2015; ILLEPERUMA 2000] coupled with inadequate awareness and education [MALAWATANTRI *et al.* 2016].

In the lower part of the Kelani River basin (hereafter referred as the meandering zone), the Biyagama export promotion zone and Seethawaka industrial zone the considerable number of major wastewater generating industries; raw rubber factories, rubber latex factories, textile industries, food and beverage industries, steel manufacturing factories, fertilizer manufacturing factories, and industries are located [DHI 1999; MAHAGAMAGE, MANAGE 2014; 2015].

However, it is noted that limited recent information is available on the catchment's characteristics, land-use practices and anthropological activities on quality of groundwater in the Kelani River basin and its meandering zone, despite some studies performed during past three decades

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The Kelani River basin between 6°47' to 7°05' N and 79°05' E has a basin area of 2230 km². The basin has an average annual rainfall and of about 800–1500 m³·s⁻¹ during the monsoon season [SILVA *et al.* 2012]. The Kelani River is divided into three regions; the Headwaters region: Hanwella, the Meandering region: Hanwella, and the Estuary region: Mattakkuliya. The present study, sampling was conducted in the meandering zone from Awissawella to Mattakkuliya due to a data gap.

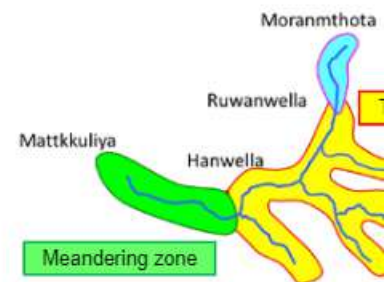


Fig. 1. Major zones of the Kelani River basin. Source: own.

POPULATION AND HOUSING DENSITY

It is noted that the population density increases towards the downstream of the Kelani River basin, except the plantation areas where the working population density is high. The population density is high in the meandering zone, including waste and significant.

Table 1 depicts the population density in the Gampaha districts from 2012 to 2017. There is a gradual increase of population density which enhances the increase in the meandering zone of the Kelani River. Figure 2 illustrates the distribution pattern of population density in the catchment of the Kelani River. The density of housing units is high in the meandering zone of the Kelani River.

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...suring the sustainability of the meandering zone of the Kelani River and provision of water with adequate quality for consumption.

...use patterns on agricultural zone of the Kelani River basin

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...g... mining process, natural vegetation, etc., which were located 15 m from left and right banks of the river. The Google Earth and Arc GIS 10.0 software were used to prepare site maps for the 15 m zone from the Kelani riverbanks. It also should be noted that in some circum-

...ected information and market checked with relevant Google mation on confirmed site map ter the required data.

