

Water quality and health of *Pinga Oya*

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Abstract: Pinga Oya is a tributary of the River Mahaweli, which mainly runs through the Akurana town along A9 highway and falls into River Mahaweli at Katugastota. This stream is one of the polluted streams/ivers in Kandy district. This paper attempts to assess the 'river health' of 'Pinga Oya', in terms of its water quality and its watershed ecosystem, as it is an important political, social, and economic issue of the region.

Keywords: Pinga Oya, River health, Water quality

Introduction

Rain water, surface water and ground water are the main sources of water for mankind. Rivers and streams are important resources, crucial to a range of water and land-based ecosystems and activities. The restoration and maintenance of 'healthy' river ecosystems have become important objectives of river management (Gore, 1985; Karr, 1991; Rapport, 1991). Their health is influenced by natural factors such as climate and soil and rock type; however their health is also significantly affected by human activities. What people put into water, either directly through discharges or indirectly via run-off from land, affects the quality of water and its suitability for drinking, recreation, industrial use and aquatic life.

Water quality refers to the chemical, physical and biological characteristics of water. It is a measure of the condition of water relative to the requirements of one/more biotic species and/or to any human need/purpose. Water quality is closely linked to water use and to the state of economic development, human health and social class.

The term 'river health', applied to the assessment of river condition, is often seen as being analogous

with human health, giving many a sense of understanding. Traditionally the assessment of river water quality has been based solely on the measurement of physical, chemical and some biological characteristics. Measurement of aquatic biota have now gained acceptance for river assessment. (Norris and Thomas, 1999)

Post independent years in Sri Lanka have sadly seen erosions in the health of its rivers. River abuse through domestic waste dumping, industrial pollution and catchment erosion has grammatically increased. (Athukorala, 2002)

Akurana is a small town in the Kandy District surrounded by mountainous areas and fed by streams. Pinga Oya (Fig. 1) the main river that goes through the Akurana town, along A9 highway is one of the most polluted rivers in the Kandy district. This has caused

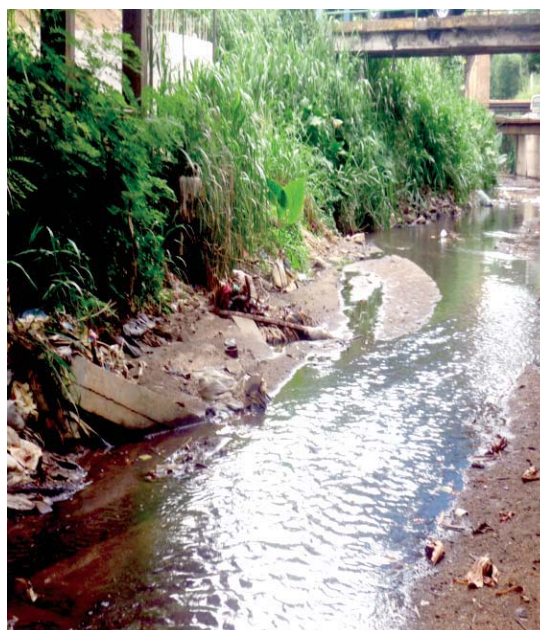


Fig. 1: Pinga Oya

numerous environmental problems. Further, it floods frequently nowadays causing huge economical loss to the inhabitants and blocking the transport along A9 highway (Fig. 2).



Fig. 2: Flooding Pinga Oya along A9 Road (Dec 17, 2012)

To mitigate the economic losses and environmental problems due to the polluted Pinga Oya, which floods frequently the water quality and the reason and frequency of flooding must be studied in the long run. Hence, one of the objectives of this major work is to monitor Pinga Oya (water chemistry and biology) regularly for its health across the region to assess the current state of water quality, changes over time and the nature of contaminants.

Methodology

The exploratory research technique based on inter-disciplinary was mainly used in this river health assesment study of Pinga Oya. Assessment of river health involves comparisons. Comparisons were made by looking at various research studies at different time periods. Indicators thought to represent river health are generally compared between sites that are thought to be similar in the absence of degradation. There are

many possible indicators of river health, including measures of structure and function both of the biotic and of the physical components (Norris and Thoms, 1999). The changing patterns of the ecosystem was identified through selected indicators. One such indicators was chemical parameters.

Waters quality

Water quality parameters such as pH, dissolved oxygen (DO), biological oxygen demand (BOD₅), chemical oxygen demand (COD), turbidity, electrical conductivity (salinity) and nutrients (nitrogen and phosphorus) are important indicators of ecosystem health and can provide a measure of damage to Pinga Oya attributed to human activity. Significant deviation of these parameters from 'natural' levels can result in ecosystem degradation and may impact environmental qualities and beneficial uses. Measuring parameters, including a group of major anions and cations such as chloride, bromide, magnesium, iron and magnesium will enable further characterise the chemistry of the waters, determine groundwater inputs and identify any contamination. Inumeration of faecal coliforms indicate how much bacteria are present in that water. High nutrient and bacteria levels reflect the region's extensive agricultural development and particularly influence of domestic (kitchen and sewage) wastes on Pinga Oya.

Results and discussions

This is based on the field suevys and secondary data obtained from various sources. The unhealthy status of Pinga Oya is subject to pollution by various sources.

According to Wijekoon and Herath, (2001) elevated levels of faecal coliforms (500 – 7,000 cfu/100ml) and relatively lower DO concentration (range of 6.5 – 2 mg/l in most occasions) were recorded. This may be due to sewage discharges from household septic tanks along the river basin. Further, they report low levels of nutrients (less than 2 ml/l) and the BOD₅ (less than 5mg/l) and reasoning out as effects of good dilution and high assimilation. However, higher COD value were recorded at some

locations imply that the organic matter making up the COD may include substances that are slowly biodegradable that can be harmful to aquatic life. This is a noteworthy result, explaining why there are hardly any fish species found in Pinga Oya nowadays.

Seneviratne (2002), who studied water quality of Pinga Oya, with emphasis to heavy metal (Pb, Zn & C) pollution in the water and sediments, reports that there is no correlation between the results of heavy metal concentrations present in water and sediments. Of the three ions studied, Pb ion concentration was little higher (range: 0.070-0.455 ppm) than the standard value given by Central Environmental Authority, whereas Zn and Cd ion concentrations (Range: 0.107-0.360, 0.01 – 0.08 ppm, respectively) were lower.

Mahees et al (2011) argue that the sources and causes of Pinga Oya (catchment) are not only limited to Physical, Chemical and biological origin, but also caused by many socio-economic and cultural practices of people. The study further says that there is a correlation between the solid waste generation and environmental problems of Pinga Oya.

It is obvious to see many different types of physical pollutants, such as polythene, tires, and household items present all along the Pinga Oya. Smoon (2013) suggests that we now have a sick river, which is now a patient suffering from deadly disease.

Conclusions

The symptoms and the indicators of poor health of Pinga Oya may be more easily defined and understood with certain factors. These factors include physical, chemical, biological, social and economic variables. We can closely monitor these factors in future. There is no considerable climatic impact for the change (affect) of ecosystem of Pinga Oya. A human induced disturbance is the most prominent factor which causes for the change of stream morphology, quality of water, vegetation diversity and stream corridors in Pinga Oya.

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