Physicochemical characteristics and pollution trends of the Kiridi-oya basin in 2022

H.S.P.Sayakkara (Hydrogeologist), A.G.A.Jayawardhana (Hydrogeologist), D.W.M.S.S.K.Dissanayake (Hydrogeologist)

Groundwater is the water found below the ground surface, which is contained in the pores of the soil and cracks in the rocks. Globally, about 96% of the non-frozen freshwater that is accessible for human consumption is in the form of groundwater (Rajeevan and Mishra, 2020). It has been the backbone of socio-economic development in many countries. Groundwater is a vital and natural resource for life due to its purity and availability while playing a significant role for in the domestic, agricultural, and industrial sectors. However, ground water is highly permeable to contamination with various type of pollutants and its quality cannot be restored back easily (Helena *et al*.,2000). Several materials have been identified as contaminants found in groundwater such as synthetic organic chemicals, hydrocarbons, inorganic cations, inorganic anions, radionuclides and pathogens (Fetter et al., 2019). In Sri Lanka, about 80% of the rural domestic water supply needs are supply from groundwater by means of dug wells and tube wells. In many areas in Sri Lanka where surface water and pipe borne water systems are not fully reliable and most of the industries in the country are depend heavily on groundwater because of its good quality and self-manageability (Panabokke and Perera, 2005).

The kiridi-oya basin is lies in the South-East part of the dry zone of the Sri Lanka, with a catchment area of 1,203 km2 and river is 118 km long (Sirisena, 2008). As well as it spreads over Badulla, Monaragala and Hambanthota districts of the Provinces of Uva and Sothern and bounded by Mahawali Ganga basin in the north, Walawe Ganga and Malala Oya basins in the west, Manik Ganga basin in the east and Indian Ocean in the south. It is an important source for water and agricultural purpose since ancient period (Molden et al., 2001). The area having low rainfall, high ambient temperatures and lower relative humidity are the specific characters of this basin. However, This, river flows for 118 km distance starting from the medium range hills of Sri Lanka to the Indian Ocean (Molden et al., 2001). As there is very limited flow to the Indian Ocean from this river, the Kirindi-Oya river basin is considered to be closed basin (Abeysingha et al.,2020).

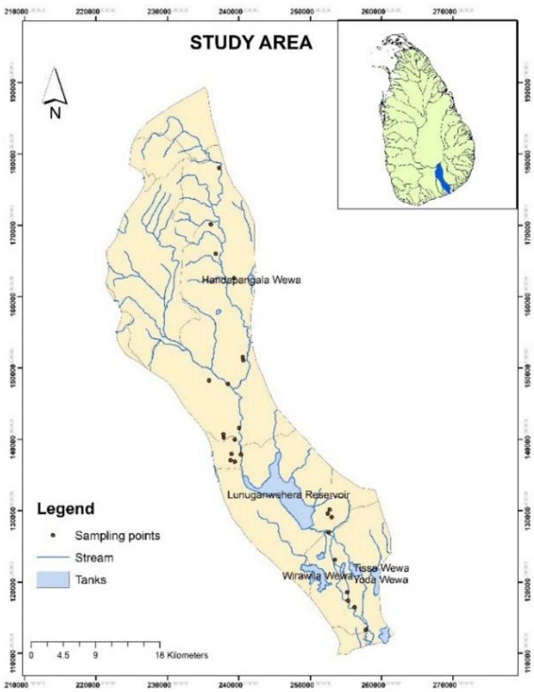

Figure 01. Ground water sampling locations of the Kiridi-Oya River basin

Figure 02: Delineated catchments, Wellawaya and Thanamalwila in Kirindi-Oya River basin in Sri Lanka (Abeysingha et al.,2020).

According to (Abeysingha et al.,2020) this area can be divided into three parts using elevation. The upper part belongs to the Wellawaya area, the middle part belongs to the Thanamalvila area, and the lower part belongs to the Thissamaharama area. The upper part has a high rate of agricultural work, industrial work, and urbanization compared with other areas. As a result, a large amount of fertilizer, pesticides, and industrial waste is added to the surface water. In this study carried on, the variation of sulfate (So4--), Electrical conductivity (EC), Total Dissolved Solid (TDS), and Total hardness (TH) in the first and third quarters of the year 2022 is analyzed.

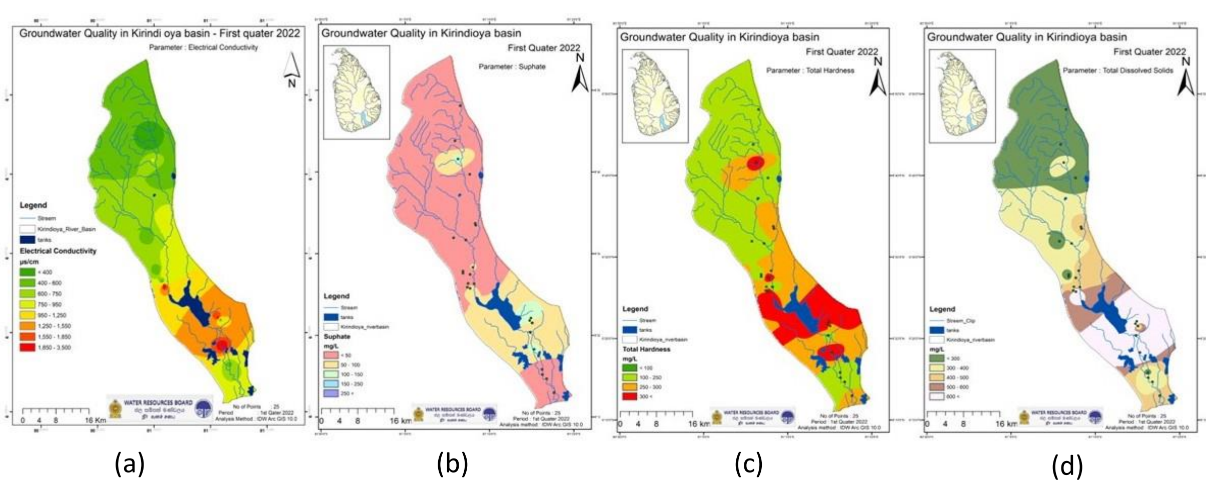

Figure 03: Chemical distribution maps in First quarter (a) Electrical conductivity (b) Sulphate (c) Total Hardness (d) Total Dissolved Solid

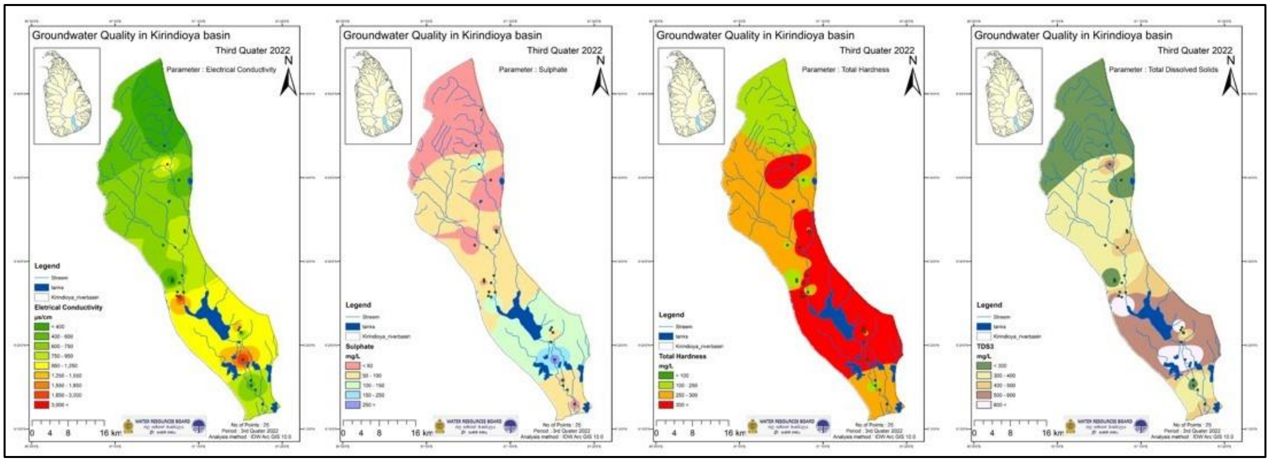

Figure 04: Chemical distribution maps in Third quarter (a) Electrical conductivity (b) Sulphate (c) Total Hardness (d) Total Dissolved Solid

According to figure 3 and 4, there is no difference in the parameter between the first and third quarters. But in studies carried out in upper to lower areas, the lower area concentration of these parameters takes a higher value. The reason for this is that the slop of this land is high, so the amount of dissolved chemical components entering groundwater is minimal. But in the lower areas, the accumulation of dissolved chemical components in groundwater is high. Also, high values of the parameters are seen in the lower area near the Lunugamwehera tank. Further research is needed to analyze the reason for this.

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