

The basic principle of geomorphology explain that past geomorphology processes left the real traces and reflect to specific characteristic on present landscape phenomena: the other way, the present landscape phenomena is the key to the past geomorphology processes, that called by "*Principle of Uniformitarianism*". One of interesting phenomena to be studied related with the basic principle of geomorphology is availability of the brackish to saline groundwater variety in the unconfined aquifer in Quarternary landscape of the southern part of Kulonprogo District. Purposes of this research are: (i) to study the influence of landform genesis on aquifer hydrostratigraphy; (ii) to study the evolution of the groundwater in the unconfined aquifer with the hydrogeochemical as an geoinicator, and to study the factors underlying variation of groundwater characteristic in the unconfined aquifer; and (iii) to reconstruct the spatiotemporal pattern of aquifer hydrostratigraphy and groundwater hydrogeochemical in the unconfined aquifer, associated with landform genesis in the research area.

The research uses a survey method that emphasized on the measurement of primary data, such as landform genesis aspects, aquifer hydrostratigraphy, and groundwater hydrogeochemical in the unconfined aquifer. The framework of analysis in this research is landform, as a main obyek in the geomorphology. Data are measured and selected by using area purposive sampling and stratified sampling technique, base on distribution pattern of landform unit and variation of groundwater characteristic in the unconfined aquifer. Moreover, data are processed and analyzed using quantitative and qualitative methods in obtaining a real descript of the value and the spatial distribution of each of the objects of study in the research area.

The results of the research indicate that first "*landform genetic influences on the forming of aquifer hydrostratigraphy in the research area*". The research area consists of 3 aquifer systems, i.e. the Fluvio-marine Plain Aquifer System, Flood Plain and Natural Levee Aquifer System, and the Complex Aquifers of Beach Ridge, Swale, and Sand Dunes. Each of the aquifer system has the typical characteristic, showed by system and pattern of material stratigraphy in the aquifer and variation of groundwater characteristic in the unconfined aquifer. Second result indicates that "*landform genetic influences on evolution of groundwater in the unconfined aquifer, reflected from the variation of groundwater hydrogeochemical processes in the research area*". At the landform units of complex of the beach ridges, swale, and sand dunes, flood plain and natural levee, are included bicarbonate and semi carbonate groundwater in the form of $\text{Ca}(\text{HCO}_3)_2$ and $\text{Mg}(\text{HCO}_3)_2$ compounds. At the fluvio-marine plain landform is formed 3 groundwater type, i.e. chloride, sulphate, and semi carbonate type. Chloride groundwater (CaCl_2 and MgCl_2 type) especially in the middle of this landform, associated with the drainage pattern of Serang River, Wates and Panjatan Bay in the past. Sulphate groundwater (CaSO_4 type) locally is around the Serang River shifting near the estuary, Wates and Panjatan Bay in the past, associated with the location of lagoon in the past (Pleistocene era). At the others area in the fluvio-marine plain landform, generally groundwater in the unconfined aquifer belonging to semi bicarbonate type in the form of $\text{Ca}(\text{HCO}_3)_2$ compound. Factors the influencing of the variety of the groundwater characteristic in the unconfined aquifer in the research area are: (i) the process of seawater evaporation of lithoral zone that left salty crystals, and continued by the process of salty crystals dillution into groundwater in the unconfined aquifer, forming *evaporate water*; (ii) the process of cation exchanges from marine clay minerals of lithoral zone to form *connate water*; (iii) the reduction process due to the decomposition of organic materials at lagoon in the past forming *sulfate water*, and (iv) the dillution of marine sand and fluvial alluvium minerals to form *bicarbonate* and *semi bicarbonate water*. The third result indicates that "*spatiotemporally, landform genetic in the research area influences on the forming of aquifer hydrostratigraphy and groundwater hydrogeochemical in unconfined aquifer, in the 3 phases or chronology, i.e. the first stage at the end of the Tertiary epoch (end of Pliocene era), second stage at the Quarternary epoch (as long as the Pleistocene period), and third stage at the Holocene era*". The genesis and chronology of landform forming in the 3 phases above influence on the forming of system and pattern of aquifer hydrostratigraphy and the variety of hydrogeochemical processes cause the evolution of groundwater in the unconfined aquifer in the research area.

Key words: *genesis, groundwater evolution, hydrogeochemical, hydrostratigraphy, landform, and groundwater*