

HGG001-P02

Room:Convention Hall

Time:May 26 14:00-16:30

Relationship between land surface condition and shallow groundwater in the Irrawaddy River delta, Myanmar

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Groundwater is widely used as a water resource in the Irrawaddy River delta. But, Groundwater has some chemical problem in part of the area. To use safety groundwater for health, it is important to make clear the actual conditions of physical and chemical characteristics of groundwater in this delta. Besides, Irrawaddy River delta is one of the most riskiest area by the flood and high waves through cyclone or monsoon. Especially, change of land surface condition by any disaster affect to the physical and chemical characteristics of shallow groundwater. So, it is necessary to make clear the actual condition of effect of land surface conditions to the shallow groundwater, to secure a good aquifer for sustainable shallow groundwater resource supply.

The purposes of this study are to analyze the physical and chemical characteristics of shallow groundwater quality related to geomorphology, geology and land use. Water samples are collected at 36 measurement points of river and groundwater in the dry season (January, 2010) and wet season (September, 2010), and analyzed dissolved major ions and oxygen and hydro-stable isotope compositions.

There are some groundwater flow systems and these water qualities are different in each area. Also, shallow groundwater quality composition showed Na-Cl-HCO³ type at central delta. This type is not similar to Irrawaddy River water which showed Ca-HCO³ type. According to the relation deuterium and d-excess, it is estimated that recharge area of shallow groundwater is Pegu and Alakan mountains or Irrawaddy River water. At the central delta, Shallow groundwater is mixed by both waters. These showed that Irrawaddy River water is recharge to the portion of shallow groundwater, but chemical characteristics is not affected to the shallow groundwater. So, chemical characteristics of shallow groundwater are closely related to geomorphological, geological and land use conditions. Land use is crops, paddy field and residential area in the delta, so it is possible that this water quality type is effect by any human activities. At the shallow depth of western area and the 10 to 40 m depth of central area, groundwater quality composition is similar to Irrawaddy River water. Seasonal change of groundwater qualities is different in each area.

It was summarized that shallow groundwater quality is affected by land surface conditions which is different in each area.

Keywords: Irrawaddy River delta, shallow groundwater, land surface condition, human activity, water quality