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Development of the water-resources analysis system The analysis of the amount of ground-water of Yamato-River Basin -

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The water resource analyzer is developed for analyzing the Yamato River basin. So, the basin was shortage water for 2 million people living. The shortage water was obtained by the adjoined other basin, Kidu river and Kino River. The water was used for industry or rice field or orange. It is important to know the amount of water resource for when city is not securable enough water as it has no rain. The analyzer system consists by some systems, the data is exchange together, and it shares same data. The data was on text or on image. The system relate the color information or text data to the hydrological information (rainfall, temperature, calculated amount of evaporation etc.), land use, geological data(Geology, altitude, soil condition), city information (people, sewage system, supply water system, dams etc.), industrial data(Scale, Sales, Kind etc.) and The River information (The river form database make up by tree node, flow rate). We have original GIS software developed by the Author, the water resource analyzer, Tririnia-Hexa diagram viewer, the water quality database include stat and graph making.

The river water level at Oujii observing station changes around 32m. the both of river water and groundwater level at Oujii is low in all observing station in Nara basin, it is estimated groundwater of Nara basin corrected at Oujii and flow out of catchment at Oujii.

The amount of presipitation was calculate by using Meteorological Agency data of average 2002. The amount of dam water is sum of effective amount of water. The amount of pond water is created by degital map and GIS data. The amount of water from other basin is calculated by max of Watering plan of the Japanese government. The river flow is calculated by sum of day flow at Oujii obseving station in 2002. The amount of eaporation is calculated by Thornthwaite method dusing month average temperature of Meteorological Agency data. The water in the Nara basin is shortage, so it means difficult to calcuete amount of groundwater from other water source. Generally, it is difficult to mesure amount of groundwater directly, as amount of ground-water is estimated by the other water calculation.

The water balanse from 1960 to 2005 is usually shortage, the Nara Basin has water problem. It is inportant to make sure of necessary water in the Nara basin.

Results of water balance disagree with actual phenomenon. The amount of the precipitation and provided water from other basin is equal to the amount of the river flow and the evaporation. As the geological condition of mountain around the basin is granitic rock, surface water was infiltrating poorly, and then flows into the Nara Basin directly. And the flow observing station is only located lower stream in the basin. So, the flow value assign evenly by an area, flow out value reduced a generous amount of value. The groundwater level was seasonally changed with precipitation at round the Nara Basin. So, the response of precipitation is quick comparatively, groundwater level changes about 50 cm per 100mm/month of precipitation in east of Nara Basin. It is estimated that water level changes seasonally in water input area. However, the groundwater level is flat or little changes in annual at central Nara Basin. The water level of river at the west Nara Basin is low in the whole basin, so it is estimated that all water of the Nara Basin is collected to this area.

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