

ドイツと日本の地下水資源量評価

Evaluation of groundwater resources in Germany and Japan

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Water shortage has been a topic on the local, regional and global scale. Therefore, the evaluation of groundwater resources as part of the water cycle has gained much attention with the aim of sustainable management. Generally, groundwater can be found all over the world, but the availability as water resource depends on hydrogeological conditions such like recharge, hydraulic conductivity and depth of targeted aquifer. Despite of these difficulties, the World-wide Hydrogeological Mapping and Assessment Programme conducted by UNESCO, BGR et al. WHYMAP(2009) achieved to create a first of its kind Groundwater Resources Map of the World, by compiling hydrogeological information at a global scale.

From a more detailed view the occurrence and availability of groundwater differs significantly due to different geological and hydrogeological conditions. Furthermore, information and data on groundwater and the hydrogeological systems exhibits big differences. For example, a comparison of Germany and Japan reveals a different evaluation method of groundwater resources in each country. Based on this comparison we introduce here the groundwater recharge map of Berlin city and compare it to the latest study about groundwater discharge map of Japan Islands.

In Germany, 73% of household water is provided from groundwater, and the recharge of groundwater resources is evaluated in the whole country with authority of the local government. In Berlin, the capital of Germany, all household water is provided from groundwater. The groundwater recharge is evaluated in great detail, such as every street, with accuracy of 50mm/yr (Berlin City, 2007). The amount of annual groundwater recharge was calculated by the following formula:

$$GW=P-E-R \quad (1)$$

with GW: Groundwater Recharge, P: Precipitation, E: Evapotranspiration, R: Runoff.

In Japan, the ratio of groundwater use in the total household water is only 13%. Therefore, the above-mentioned groundwater recharge map only exist at some local areas and still not covers the whole country. Ito(2008) has developed a groundwater discharge map of Japanese Islands, dividing them into 204 areas, and applying the formula (1) in each area. The map shows as one of the important results, that the amount of groundwater discharge into the sea is larger in the western Japan than the eastern. This knowledge explains some of the observations made in these

regions. We think we have to advance the groundwater evaluation also in Japan after this.

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References

Berlin City (2007). 02.17 New Groundwater Formation (Edition 2007). <http://www.stadtentwicklung.berlin.de/umwelt/umweltatlas/ei217.htm>

Ito, N. (2008). Evaluation of submarine groundwater discharge in Japan Islands (In Japanese). Risyo University. Doctor of Science.

WHYMAP (2009). GROUNDWATER RESOURCES MAP OF THE WORLD 1 : 25 000 000. World-wide Hydrogeological Mapping and Assessment Programme. <http://www.whymap.org/>