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Type and Origin of Springs and Hotsprings at Surrounding Ridges of Bandung Basin, Related With its Potential Natural Contamination

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Abstract

Type and origin of groundwater is important to understand potential natural contamination. Bandung Basin in West Java Indonesia as an intra montan basin was chosen for this study. In some places, groundwater chemistry could be related to volcanic and thermal activities and may lead as the source of natural contamination to the water resources. In this research, seven water samples from southern and northern ridges of Bandung Basin were taken and analyzed. In order to determine the type, origin of the water and potential natural contamination, hydrogeochemistry and stable isotopes H^2 and O^{18} were used in this research. The methods were used to interpret the mixing mechanism between thermal water and shallow groundwater with minerals in the aquifer. The thermal water from Walini in southern ridge and Maribaya in northern ridge can be distinguished to be related with deep geothermal activities as mixing of upflowing thermal fluid with shallow groundwater. Thermal water from Kamojang site is related with meteoric water and not related or mixed with deep thermal water. One cool spring water near Kamojang hot spring shows it could be influenced by deeper water/fluids. Two other samples from springs around a hydrothermal mineralization show that Arsenic and other metal ions concentration in mineralized aquifer is present at a very low concentration

Keywords: hydrogeochemistry; isotope; geothermal water; hydrothermal mineralization

1. Introduction

Contamination in shallow groundwater and surface water can be occurred as natural phenomena. Water resources in some geological regions e.g. volcanic areas are potentially contaminated by element that related with magmatic activity, hydrothermal mineralization or deep thermal water. Arsenic, mercury and chloride are commonly found in volcanic region as natural mechanism of upflowing and mixing of thermal fluids in shallow aquifer. In this research type and origin of water or thermal water in some springs in Bandung basin were used to determine mechanism of release or sink the contaminant in groundwater.

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2. Geology

Bandung basin in West Java, Indonesia is located in volcanic ridge. The basin is surrounded by Burangrang-TangkubanPerahu at north ridge and WayangWindu-Mandalawangi at south ridge. The basin is comprised by unconsolidated and undifferentiated Quaternary volcanic product and in some plain area lake deposit is found between the volcanic layers (Dam and Suparan 1992; Dam et al 1996). Some volcanic and magmatic-thermal activities and hydrothermal mineralization around Bandung Basin may lead as source of Arsenic and other metals in shallow groundwater, springs and surface water.

3. Water Samples

Water samples were taken from 7 locations, the samples represent thermal waters/hot springs (HS-2-KMJ, HS-3-WAL, HS-6-MBY and HS-7-DMS), and natural cool springs (S-1-CBR, S-4-CB and S-5-TA). Some physical and chemical parameters like temperature, TDS, pH and Eh were measured on site (Table 1). Spatial distribution of the samples are representing thermal water and shallow groundwater from southern and northern volcanic ridge of Bandung Basin, the samples distribution overlaid with morphology of Bandung Basin can be seen in Figure. 1.

Table 1. Sample locations and some physical and chemical parameters of water samples

Sample ID	Location	Temp. (°C)	TDS (mg/L)	pH	Eh (mV)
S-1-CBR	Spring, Cibereum, Southern Ridge Bandung	23	500	3.7	24
HS-2-KMJ	Hot Spring, Near kamojang Geothermal Field, Southern Ridge Bandung	62	2300	5.8	12
HS-3-WAL	Hot-Spring, Ciwalini, Southern Ridge Bandung	48	8600	6.0	20
S-4-CB	Spring, near gold artisanal mining, Southern Bandung	26	800	5.5	10
S-5-TA	Spring, near gold artisanal mining, Southern Bandung	27	700	5.6	5
HS-6-MBY	Hot Spring, Maribaya, Northern Ridge Bandung	44	1500	5.5	10
HS-7-DMS	Hot Spring, Domas Crater, TangkubanPrah, Northern Ridge Bandung	62	1000	1.8	20

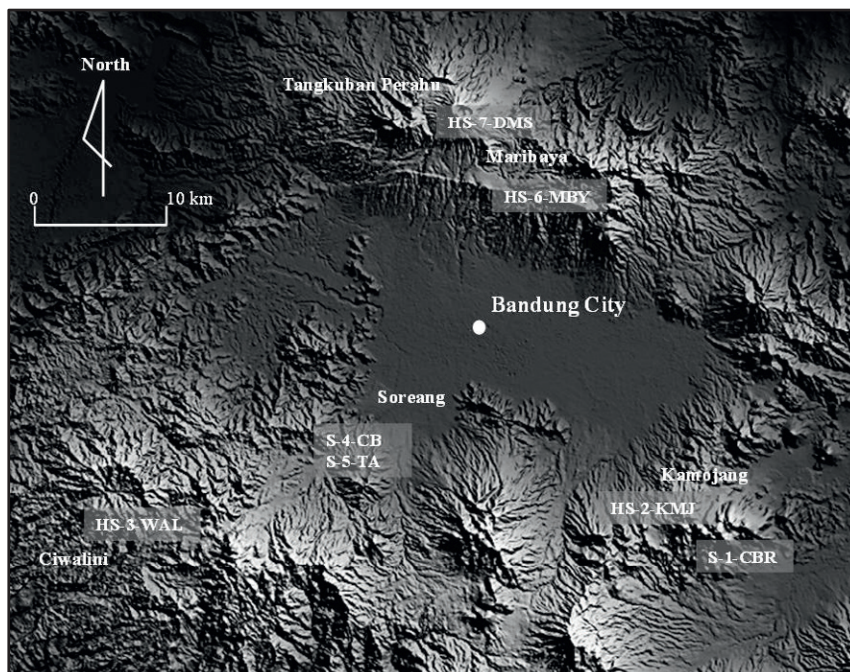


Figure 1. Sample location overlaid with Morphology of Bandung Volcanic Basin

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