THE INFLUENCE OF PRECAMBRIAN METAMORPHIC ROCKS ON GROUNDWATER IN THE CHYULU AREA, KENYA.

by

G. M. Mailu
Ministry of Research, Technical Training and Technology
P.O. Box 30568
Nairobi, Kenya

ABSTRACT: The Chyulu Area is characterized by an extensive contact between the Precambrian metamorphic rocks and the overlying volcanic rocks. The area underlain by metamorphic rocks is characterized by lowlands with an average altitude of between 400-900m above mean sea level (amsl) and the area underlain by volcanic rocks forms the Chyulu Hills with an altitude of between 1200m and 2000m amsl. The area is bounded by latitudes 2°5' and 3°5' south and longitudes 37°20' and 38°35' east. The geology of the area has been critically examined to evaluate its impact on groundwater. Springs at the contact zone are located at specific points that could have geological or paleogeographic control. The chemical quality of the groundwater varies with rock type. This indicates that the metamorphic and volcanic rock aquifers are not interconnected. Although the groundwater is important for present and future tourism and agricultural development of the area, its quantity has not been satisfactorily assessed. There is an urgent need to quantify the groundwater resource of the area in order to ensure its optimum development and utilization.

RÉSUMÉ: La région de Chyulu est caractérisée par un large contact entre les formations métamorphiques du Précambrien et leur recouvrement volcanique. La partie métamorphique forme des plaines entre 400 et 900 m d'altitude ; la partie volcanique constitue les Monts Chyulu, entre 1200 et 2000 m d'altitude. Cette région est située entre les latitudes 2°5' et 3°5' S et les longitudes 37°20' et 38°35' E. La géologie régionale a été étudiée en détail sous l'angle de son impact sur les eaux souterraines. Ces études ont montré que les sources de la zone de contact apparaissent en des points particuliers, contrôlés soit par la géologie, soit par la paléogéographie. La qualité des eaux souterraines dépend du type de roche. Elle montre que les aquifères des roches métamorphiques et des roches volcaniques ne sont pas interconnectés. Bien que l'eau souterraine soit importante pour le développement actuel et futur du tourisme et de l'agriculture de cette région, les quantités disponibles n'ont pas été déterminées de façon satisfaisante. Il est urgent de quantifier les ressources en eau souterraine de cette région afin de pouvoir assurer le meilleur développement possible de la région.

INTRODUCTION

About 80% of Kenya consists of arid and semi arid lands (ASAL) and accommodates only 30% of the population. The remaining 20% of Kenya consists of high-potential land and supports about 70% of the population. The high-potential land is currently suffering from population pressure and the Government has invested heavily in ASAL in order to make them attractive for settlement and thus reduce the pressure in the high-potential lands.

The lowlands to the east of the Chyulu Ranges, which are referred to as the Chyulu Area in this paper, fall within the ASAL of Kenya. The land allocation which has just been completed (1991) has attracted a population of 150,000 with a density of about 50 persons per square kilometre. In contrast, the population was only approximately 60,000 about a decade ago (Makin & Pratt 1984).

Applied Hydrogeology 2/94
The population influx has adversely affected the natural resources, among which groundwater plays a very important role in the socio-economic development of the area (Mailu & Wairagu 1992). In this paper, the impact of Precambrian metamorphic rocks on groundwater in the Chyulu Area, particularly along the contact with overlying volcanic rocks, is discussed with a view to identifying sustainable development and management of the water resource for the growing population.

Applied Hydrogeology 294