

Importance of Groundwater / Surface Water Interaction in Quality and Quantity of Water Resources in Semi-arid Regions

Maki Tsujimura

Faculty of Life and Environmental Sciences, the University of Tsukuba, Tsukuba, Japan
E-mail: mktsuji@geoenv.tsukuba.ac.jp

Abstract. Interaction between groundwater and surface water is key for sustainable water management quality and quantity in semi-arid regions. We investigated recharge processes of groundwater by stream water and reservoir water in Mongolia and Tunisia. The river water recharges groundwater dominantly throughout year, though the recharge rate changes seasonally in Ulaanbaatar city, Mongolia. The reservoir water has an important role in regulation of salinization of groundwater and sea water intrusion in north-east Tunisia. Consequently, the effect of surface water on the groundwater sustainability is principle in quantity and quality especially in the semi-arid regions.

Keywords: Groundwater and surface water interaction, Groundwater recharge, Semi-arid region.

1. INTRODUCTION

Groundwater recharge in arid and semi-arid regions is characterized by low rainfall amount and low infiltration rate, due to less vegetation, high evapotranspiration rate, and temporal and spatial heterogeneity in quantity and quality. Additionally, possible responses of groundwater to climate change are, decrease in groundwater recharge, sea water intrusion, and change of residence time. Tunisia and Mongolia are the most vulnerable regions to the climate change in the world. Thus, we investigated the groundwater recharge with a multi-tracers approach, focusing on the surface water and groundwater interaction in those areas.

2. STUDY AREAS AND METHODS

In Tunisia and North Africa, we performed investigations in the Cap-bon region, focusing on dam watershed and non-dam watershed in coastal regions, also, in an inland watershed. In Mongolia, a floodplain along Tuul River flowing across Ulaanbaatar capital city was monitored on the groundwater recharge. A multi-tracers approach was applied in those areas.

3. RESULTS AND DISCUSSIONS

In Tunisia, the role of surface water in groundwater recharge was significant at dam watersheds in inland and coastal areas. Also, the effects of dam water to regulate chloride concentration in groundwater were important in coastal areas, and effects of reservoirs to mitigate salinization of groundwater were considerable as well.

In Mongolia, the contribution of the river water to the groundwater recharge was estimated to be more than 60% dominantly.

In conclusion, surface water is important as a source of groundwater recharge in arid and semi-arid regions. Thus, groundwater/ surface water cycle system should be considered for Sustainable Integrated Water Management. In the field, monitoring of groundwater should be conducted at certain locations considering GW/SW interaction. Additionally, sustainable yield/ safe yield of borehole should be discussed based on groundwater flow system.

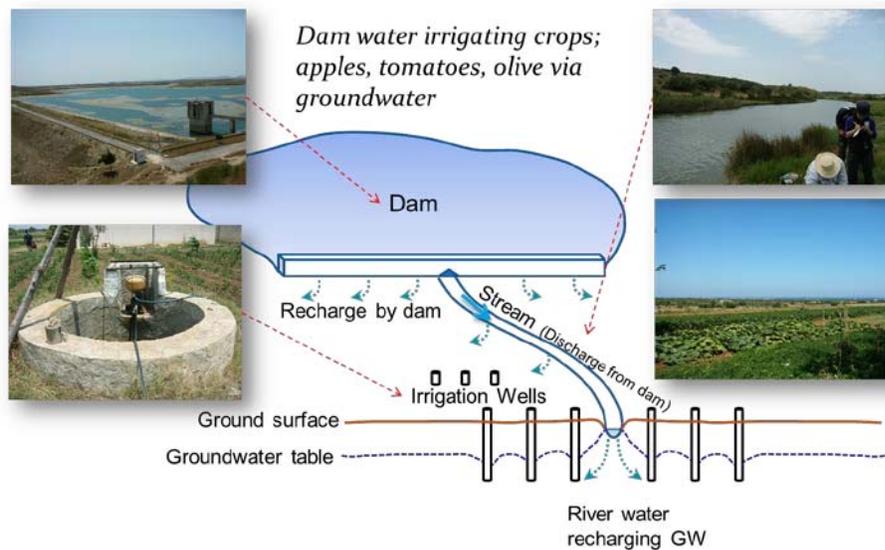


Figure 1 Schematic diagram of groundwater recharge in Tunisia.

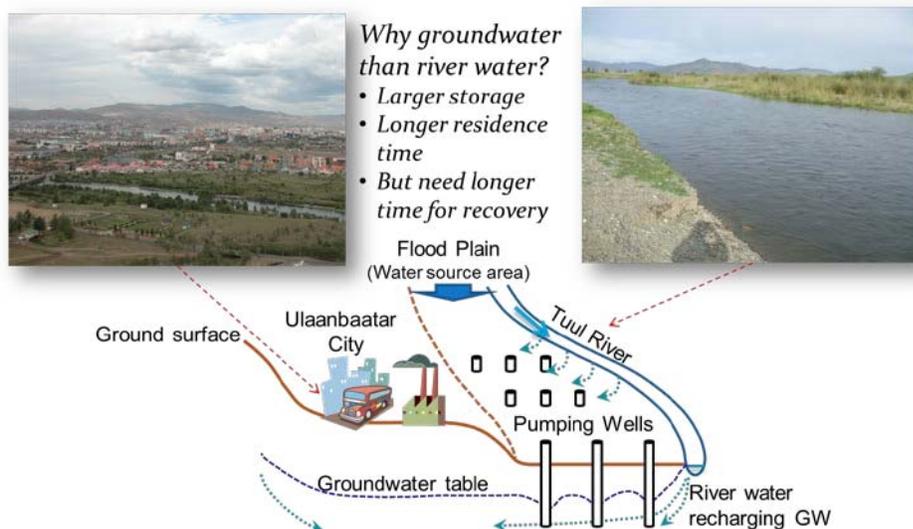


Figure 2 Schematic diagram of groundwater recharge in Mongolia.

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