Introduction

Building groundwater modeling capacity in Mongolia

Problem and Purpose

Groundwater monitoring and modeling with MODFLOW, the USGS groundwater modeling software.

Method Development

A preliminary steady-state groundwater flow model was developed as part of the workshop to demonstrate groundwater modeling techniques to simulate groundwater conditions in alluvial deposits along the Tuul River in the vicinity of Ulaanbaatar. The preliminary model grid area was about 8,200 square kilometers (fig. 3, A). Several simplifying assumptions were made in the model, given the limited objectives of the workshop training. The upper model layer was 10 m thick. Depth to groundwater was estimated from local geology, maps provided by the Freshwater Institute, Mongolia. The lower model layer was 40 m thick, representing the lower boundary of the alluvial deposits. The heterogeneity of the Tuul River alluvial aquifer properties for the groundwater flow process—U.S. Geological Survey Techniques and Methods, book 6, chap. A16, variously paged, 2012—was assumed to be an appropriate discretization of the model to represent the heterogeneity of the Tuul River alluvial aquifer properties for the groundwater flow process.

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The purpose of the workshops was to bring together representatives from the Government of Mongolia, local universities, technical experts, and other key stakeholders to build capacity in groundwater modeling and to understand key principles of groundwater modeling with MODFLOW, the USGS groundwater modeling software.

Acknowledgments

About 40 Mongolian scientists, professors, students, and government officials were trained in groundwater principles and MODFLOW (the USGS groundwater modeling software).

In-country support for training, development of existing models with local contacts, and engaged participants are critical for success.

Mongolian officials have expressed a need for more groundwater knowledge and training.

Current water use and the projected water demand from a growing urban population may not be sustainable from existing groundwater sources (fig. 1, A). In addition, a better understanding of groundwater systems is needed to address challenges such as water quantity, which is predicted to decline dramatically in Mongolia (Marklund, 2005; Government of Mongolia Ministry of Environment and Tourism, 2013).

The workshops were held at the headquarters of the Freshwater Institute, Mongolia, local universities, technical experts, and other key stakeholders to build capacity in groundwater modeling.

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