INFORMATION OF DOCTORAL DISSERTATION

Thesis title: **" Assess to the impacts of climate change and exploitation activities on groundwater resources in Cam Mau peninsula"**

Major: **Geology engineering**

Code: **62.52.05.01**

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Dissertation abstract:

Ca Mau peninsula has an area of 16,940 km^2 consisting of Ca Mau, Bac Lieu, Soc Trang, Hau Giang, Can Tho and a part of Kien Giang provinces and having agricultural activities playing a significant role in people's lives. Massive and uncontrolled exploitation of groundwater resources, along with effects of climate change in the area have caused reduction of groundwater levels and intrusion of saltwater in aquifers.

This study presents a quantitative assessment of impacts of exploitation activities and climate change on groundwater resources in the region. Models of groundwater flow and transport processes are established to assess the impacts. Recharge amounts of groundwater under climate change scenarios A2 (high emission scenarios) in current and future seasons are calculated using WetSpass software and are used as input data for these models. Parameters of the models consist of value and rate of declination of yearly average groundwater levels; value and rate of declination of yearly average storage amount; value and rate of increment of areas with saltwater intrusion. These parameters are used to compute indicators to assess the sustainability of groundwater resources and thereby propose relevant responding directions.

Results show that:

- Groundwater exploitation activities has caused declination of groundwater levels in the aquifer qp_3; qp_{2-3}; qp_1; n_2^2; n_2^1; n_1^3 with the rates of 0.33; 0.31; 1.0; 0.91; 0.52; 0.93 m/year, and declination of yearly average groundwater storage with the rates of 3.13; 31.07; 7.01; 6,21; 1,1; 0.46 million m^3/year respectively. Climate change has caused decrease of groundwater rechange in 2015; 2030; 2045; 2060; 2075; 2090 is: 1,548,505; 1,549,563; 1,408,663; 1,281,480; 1,045,515; 936,591 m^3/year; whereas, with the assumption that the extraction amount keeps as constant as of 2015.

- Climate change has caused decrease of groundwater levels in the aquifer qp_3; qp_{2-3}; qp_1; n_2^2; n_2^1; n_1^3 with the rates of 0.137; 0.232; 0.064; 0.133; 0.020; and 0.012 m/year; decrease of yearly average groundwater storage with the rates of 0.34; 2,5; 0.69; 0.66; 0.12; 0.12 million m^3/year; and increase in saltwater distribution area of 33.95; 100.65; 53.46; 30.28; 17.91; 27.16 km^2/year. The decline in groundwater levels of the aquifers qp_3; qp_{2-3}; qp_1; n_2^2; n_2^1; n_1^3 caused by climate change is 2.41; 1.34; 15.63; 6.84; 26; and 91.67 times less than the declination caused by exploitation activities respectively.

- In the coming time, groundwater exploitation activities and climate change are continuing to cause declination of groundwater levels, therefore, it is necessary to have more appropriate management and planning solutions to ensure the sustainable exploitation of groundwater resource. This study has also selected and calculated some sustainability indicators to help authority officers to plan, manage and organize exploitation regions more properly. In addition, the study has proposed directions for responding to effects of climate change on groundwater resources in the researched area.

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