

THESIS TITLE : APPLICATION OF GIS AND GROUNDWATER FLOW ANALYSES TO  
PREDICT SOIL SALINITY

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#### ABSTRACT

In the Northeast of Thailand, soil salinity is one of the most important problem in agricultural development. The soil salinity problem trends to increase every year due to improper land use management. Mahasarakham rock unit, which containing rock salt, and underlying beneath soil surface nearly all over the Northeast, is source of soil salinity. Groundwater is the main mean to bring salt solution, by flowing pass the rock salt, back up to the soil surface.

This thesis applied the geographic information system (SPANS), to cooperate with 2-D finite difference groundwater model, to determine the area of saline groundwater flowing up to soil surface. The method involved groundwater mapping, groundwater modeling, and vertical flow analysis by GIS and Darcy's law. The criteria is that in the area of the higher up welling flow and the higher the value of EC of confined groundwater, this area is likely to be more saline.

The experimental site was at Nong Han, Kumpawapi district, Udonthani. The prevailing areas for soil salinity were simulated by the proposed method. The simulating results were compared with many types of measurements namely the electromagnetic sounding of soil, EC measurement of shallow well water. The comparisons are in good agreement.

The proposed method, employed GIS and groundwater model, could be used effectively to predict soil salinity for assisting an natural resource management.