

## ***Using isotope hydrology for groundwater resource management in Thailand***

### ***The challenge...***

Rapid development and uncertainties stemming from changing climatic conditions have led to a growing increase in the demand for water resources in Thailand. The Upper Chi watershed (Chaiphum Province) and the Lower Nan River Basin face serious problems of drought and water table decline due to deforestation, overexploitation and changes in the climate. Irregular rainfall and runoff in the area are affecting water availability for domestic, agricultural and industrial uses, and there is a growing focus on integrated water resource management.

To assist decision makers and researchers, an upgrade of the analytical infrastructure for isotopes and related chemical measurements was urgently required. Comprehensive studies, using isotope as well as hydrogeological and chemical techniques, were needed to understand hydrological processes such as recharge and discharge mechanisms, surface water, groundwater interactions, the evolution of groundwater along flow path and groundwater contamination.

### ***The project...***

Through the IAEA's technical cooperation programme, support was provided to establish a national isotope hydrology laboratory, assess hydrological processes in the Upper Chi watershed and Lower Nan River Basin using isotope and other techniques relevant to water resource management, develop human resources in the field of isotope hydrology, expand the 'Isotopes in Precipitation' network and establish a national database. Essential equipment for the laboratory at the Thailand Institute of Nuclear Technology (TINT) was provided, including an ion chromatography system and a liquid water isotope analyser for the important analytical procedures required to assess hydrological processes. Three national workshops, as well as fellowships and scientific visits, were arranged to develop human resources in the field of isotope hydrology.



### ***The impact...***

As a result of the project, isotope hydrology techniques have been introduced and applied in integrated water resource management in Thailand, a top priority for the social and economic development of the country. The isotope hydrology laboratory has been fully established at TINT for groundwater sample analysis. Visits are arranged for TINT guests, including students, the general public and visiting professors, to expand public knowledge of the work carried out there. Over 3000 groundwater samples are being analysed at the laboratory from both the project and as a service for customers. This is expected to guarantee the sustainable operation of this technique in Thailand.

Analysis of the first groundwater and surface water samples has been completed, and the isotope data are currently being interpreted. Hydrological processes in the Upper Chi watershed and the Lower Nan River Basin have been assessed, highlighting abnormalities and potential areas for more detailed studies. Human capability in the field of isotope hydrology has been significantly strengthened and necessary regulations for water resource management have been proposed. With IAEA assistance, the Hydro and Agro Informatics Institute has established a national database of isotopic data on the groundwater of Thailand. It has been used in the study of isotope projects and will be a useful future reference, with its large collection of isotope data from every project carried out.