The 47th Meeting of National RCA Representatives

RCA

IMPROVING WATER RESOURCES MANAGEMENT PRACTICES BY ENHANCING THE REGIONAL COLLABORATION IN ENVIRONMENTAL ISOTOPE ANALYSIS AND APPLICATIONS - RAS7040

PROJECT DESCIPTION

Project Title: Improving Water Resources Management Practices by Enhancing the Regional Collaboration in Environmental Isotope Analysis and Applications (RCA)

Project Number: RAS 7040

Thematic Area: Water Resources Management

Lead Country: Viet Nam

Project Duration: 4 years (2022 – 2025)

Budget Allocation: 630.775 Euros

Sustainable Development Goal project aims to achieve: Ensure availability and sustainable management of water and sanitation for all.

15 participating Government Parties

Project Objective and Outcome

Overall objective

To enhance the regional capability in quality and quantity of water resource monitoring for effective development and management of ground - and surface water through the use of isotopic techniques.

Specific Objectives

- **Organize regional trainings in water and environmental isotope analysis, data treatment, and modelling for young researchers**
- **Standardize monitoring protocols and analytical programmes adapted to regional conditions;**
- **Help Member States (governmental agencies and stakeholders) to set up national monitoring networks and calibrate water resource models based on isotopic data.**

Outcome

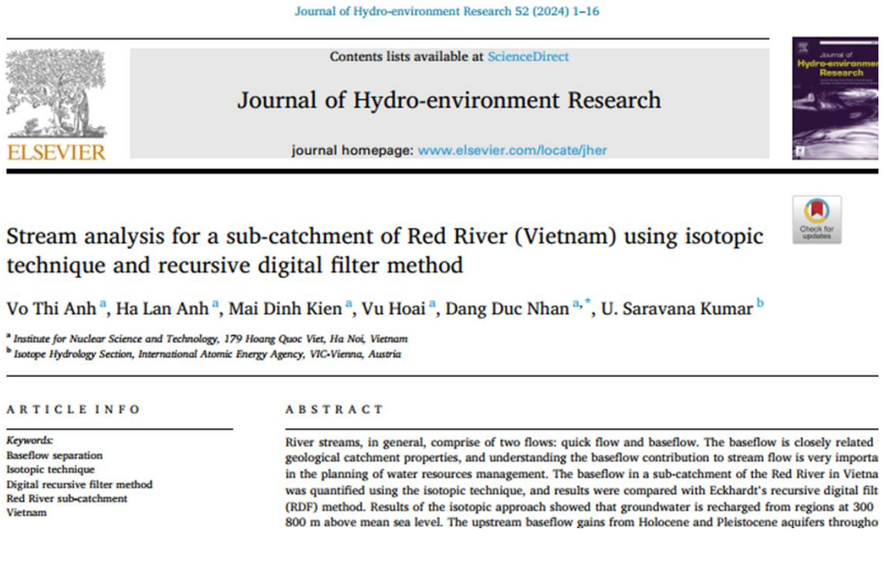
Capacity of participating countries enhanced in the use of isotopic techniques for water quality improvement and water resource management

PROJECT ACTIVITIES

In 2024: 01 RTC and 01 Mid-Term Review Meeting were organized:

RTC on "*Groundwater Flow and Solute Transport Modelling*", Nuclear Malaysia, 15-19 Jul, 2024. 25 participants from 11 countries

Published study on using isotopic techniques and a recursive digital filter method in the Journal of Hydro-Environmental Research



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ELSEVIER

Stream analysis for a sub-catchment of Red River (Vietnam) using isotopic technique and recursive digital filter method

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ARTICLE INFO

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ABSTRACT

River streams, in general, comprise of two flows: quick flow and baseflow. The baseflow is closely related geological catchment properties, and understanding the baseflow contribution to stream flow is very importa in the planning of water resources management. The baseflow in a sub-catchment of the Red River in Vietna was quantified using the isotopic technique, and results were compared with Eckhardt's recursive digital filt (RDF) method. Results of the isotopic approach showed that groundwater is recharged from regions at 300 800 m above mean sea level. The upstream baseflow gains from Holocene and Pleistocene aquifers througho

MTRM, Mumbai, India, Oct 21-25, 2024: 22 participants from 11 countries

In 2025: 02 RTCs to be held

- RTC on "Sampling Protocols and QA/QC Programme for Isotope and Chemistry Analyses of Water Samples", May 26-30, 2025 in Philippines.
- RTC on "Dating groundwater using noble gases and 14C-techniques", 21-25 July, 2025 in Thailand.

Surveys

- Data on chemistry and isotopes in rainwater, surface water (river/reservoir), and groundwater during dry and rainy seasons were collected in most countries
- A standardized sampling protocol will be developed after the RTC in the Philippines
- Support was provided to MS labs for in-field sampling and analysis:
  + 18 groundwater and surface water samples from the Vientiane Basin (Lao PDR) were analyzed for chemistry and isotopes.
  + 51 groundwater samples from Bangladesh were analyzed for major cations and heavy metals.

PROJECT EFFECTIVENESS

Output	Indicator and Baseline	Targets	Status of achievement
1. Project implementation and monitoring structure established and managed	National project teams identified for each GP	Listed key components in place by end of Q2 2022	Completed

PROJECT EFFECTIVENESS

Output	Indicator and baseline	Targets	Status of achievement
2. Improved skills in isotopic analysis of dissolved nitrogen species in water (NH_4, NO_3), in groundwater dating analysis, and in carbon isotope analysis	***Indicators***: Numbers of technical staffs trained and skilled of isotopic analysis for $d^{15}N$ and $d^{18}O$ in NO_3 using laser N_2O isotope analyser improved. Numbers from ILGPs and BLGPs trained on dual stable isotope analysis of NOx. ***Baseline:*** No research institution from ILGPs and BLGPs is capable of performing dual in stable isotope analysis of NOx.	- 9 technical staffs from ILGPs in the region trained and their skills of isotopic analysis for $d^{15}N$ and $d^{18}O$ in NO_3 using TiCl3 reduction method and laser isotope analyser. - 15 researchers from ILGPs and BLGPs trained on dual stable isotope analysis of NOx.	Progress toward target: **50%** -No training conducted due to lack of lab facilities for N-15 and O-18 analysis in NO_3. -Training on carbon isotopes and noble gases planned for July 2025 in Bangkok.

PROJECT EFFECTIVENESS

Output	Indicator and baseline	Targets	Status of achievement
3. Improved models/development of scenarios for surface water and groundwater management for socioeconomic benefits.	***Indicator:*** - Numbers of researchers from ILGPs and BLGPs trained in water modelling. - Names of numerical models available in GPs by the end of 2025 ***Baseline***: Water isotopic calibrated and validated hydrological models are not popular in GPs"	- 15 researchers from ILGPs and BLGPs trained in water modelling. - Surface and/or ground water models available in GPs by the end of 2025	Progress toward target: **Completed.** A RTC was held in July 2024 in Malaysia. 25 Trainees from 11 PCs participated. - The model is now being calibrated in participating countries

PROJECT EFFECTIVENESS

Output	Indicator and baseline	Targets	Status of achievement
4. Isotope, chemical, and hydrogeological database established.	***Indicators***: - Number of database developed by 2024 - Numbers of GIS maps in some GPs available by 2025. ***Baseline***: Most GPs do not have integrated isotopic, chemical and hydrogeological database.	- Isotope, chemistry and hydrogeological database established in each PC	**On schedule** - Progress toward target: **70%**. Most labs have established isotope and chemistry databases for rainy and dry seasons.
5. Water isotopic monitoring networks integrated for the region.	***Indicators***: Guideline to set up water isotopic monitoring networks by 2025 ***Baseline***: No regional network of water isotope monitoring has been established in APR	- Water isotopic monitoring networks (RNIP and RNIR) supported/considered by the GPs authorities - To have some protocols and agreements among GPs in setting monitoring networks and sharing	Progress toward target: **0%.** This output is expected to be completed by the Final Review Meeting in Laos, Oct. 2025.

Overview of Effectiveness

The outputs and outcomes of the Project are basically achieved as planned, except for output No.2 (Improvement of skill in dual isotopes analysis (d15N(NO3) and d18O(NO3)) using laser isotope analyzer.

PROJECT EFFICIENCY

- **Technical Staffs:** NPCs with qualified teams and young scientists enable training in nuclear and isotopic techniques for water resource management..

- **Well Organized Project Activities:** Strong support from PMO and TOs through regional activities (WS, TCs, expert missions).

- **Budget Management:** Additional support is needed for LDCs to acquire tools and materials for lab isotopic analysis and field pre-treatment of water samples.

RISK MANAGEMENT

Isotopic analysis equipment (e.g. laser spectrometer, scintillation counter) in several labs is occasionally damaged, causing delays or requiring support from other labs.

> In time assistance from the IAEA, LC and GPs

GENDER EQUALITY

Nearly half of National Working Team members are women, meeting the Gender Equality Target. Female staff actively engage in field sampling and lab analysis

> the Gender Equality Target is achieved.

ACTIVITIES TO BE CARRIED OUT IN 2025

1. Ongoing chemistry proficiency test with participation of 10 Labs
2. Continue isotope and chemical analysis of collected samples
3. Joint writing a Success Story of the Project
4. Final Review Meeting scheduled in Oct 2025 in Vientiane, Laos PDR

RECOMMENDATIONS

- Participating GPs are requested to provide inputs for the final project report and consider jointly establishing a minimum data set on hydro-environmental research.

- IND and AUL will coordinate with the LC to prepare for the Success stories of the project.

- Thank all NPCs, NPTs, NRs, RCA-FP and IAEA TOs for their tremendous contributions
- The IAEA and GPs continue support for thematic area of isotope hydrology for next cycle as it plays a key role in sustainable water resource management across the region

Thank you for your attention

In- field training for Laos PDR's colleagues on groundwater sampling for chemistry and isotopic analysis