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# IWMI Southeast Asia

## Sustainable groundwater use in rainfed farming systems of Lao PDR

**Time frame:** July 2012 – July 2016

**Location:** National, with a focus on selected areas in Vientiane, Bolikhamsai and Champasak provinces

**Donor:** Australian Centre for International Agricultural Research (ACIAR); CGIAR Research Program on Water, Land and Ecosystems (WLE); CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS)

**Partners:** Ministry of Agriculture and Forestry (MAF) - Department of Irrigation; Ministry of Natural Resources and Environment (MoNRE) - Department of Water Resources, and the Natural Resources and Environment Institute; National University of Laos (NUoL) - Faculty of Environmental Sciences and Faculty of Water Resources; Groundwater Research Center - Khon Kaen University; Institute for Global Environmental Strategies (IGES); Mekong Development Center

### Background

The majority of people in Lao PDR rely on agriculture for their livelihoods. However, most farmers can only grow a single crop each year on small plots of land that can be severely impacted by climate variability. The total area under irrigation still remains very low and is almost entirely sourced from surface water. Groundwater development can potentially offer water on demand for crop intensification and diversification as well as for livestock. Experience using groundwater for irrigation is limited. The approach has great potential, if the main barriers can be overcome and the available resources are adequately understood and sustainably managed.

### The approach

This multi-disciplinary project has six main interlinked components:

#### 1. **Development hot spots and resource potential**

This component seeks to establish a rational basis for selecting prospective areas and aquifers for groundwater development. It takes into account important non-hydrogeological variables such as soils, land capability, irrigation potential, proximity to markets, etc. At a larger scale, satellite imagery and geographic information system (GIS)-based techniques, backed up by ground-truthing and field data, are being used to map hot spots for groundwater development. At the local scale, existing data are being collated, and new data are being collected and organized into an information management system.



Photo: Jim Holmes / IWMI

## 2. **Pilot evaluations**

Irrigation trials are being established in the Vientiane Plains, and monitored to determine technical performance and socioeconomic viability. Community-based approaches are being used to facilitate sustainable management of the irrigation system and groundwater resources.

## 3. **Opportunities and constraints for agricultural groundwater use**

This component seeks to analyze more fully the factors that have constrained the uptake of groundwater irrigation to date. The major activities include an agrarian system analysis at household and village levels, a perception study on how different actors view groundwater potential and use in relation to agricultural and domestic access, and focus group discussions.

## 4. **Groundwater governance and policies**

A comprehensive assessment of existing institutions and policies (both within and outside the water sector) will assess their relevance under increased demand for water in the agriculture and other sub-sectors. It involves desktop reviews, interviews, field visits, local consultations and workshops. Cross-comparisons and lessons learned will be drawn from other regions (e.g., South Asia), where groundwater use is currently more intensive.

## 5. **Sustainability assessments and modelling**

Simple approaches for estimating the replenishable resource are being tested alongside more complex numerical approaches. Analyzing groundwater requirements for more productive cropping systems takes into account the natural rates of recharge, cropping choices, the area of land that can be sustainably irrigated, other water users, water quality issues and the environment/ecosystem services.

## 6. **Capacity building, training and institutional enhancement**

Institutional and human resources capacity within the groundwater sub-sector remains extremely low. The project is providing focused training for team members and other key stakeholders covering both theory and practice on aspects ranging from the fundamentals of modeling to management and other specialist topics. Visits to view projects in neighboring countries and interact with relevant institutions are being arranged. The project is also supporting Lao nationals in postgraduate studies and other on-the-job training opportunities. Several international students are also involved in the project.



Photo: Bounmee Maokhamphiou

## Outcomes

The research will create the following:

- (i) Improved understanding of hydrogeological systems.
- (ii) Clarity on the way groundwater is perceived and used under different contexts.
- (iii) A clearer definition of the actual costs and benefits of groundwater irrigation.
- (iv) Tools that assess how to achieve sustainable development and avoid negative environmental impacts.
- (v) Strengthened technical and institutional capacity within the government, universities and other important stakeholders.

In terms of policy, recognition and governance of groundwater resources will be improved, as well as policy guidance for alternative modes of irrigation development. With the use of groundwater for irrigation, major gains for the rural poor are expected in terms of poverty alleviation, food security, livelihood enhancement, and resilience to climate variability and climate change.

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For more information and updates, please visit the project website (<http://gw-laos.iwmi.org>).

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