Groundwater for Sustainable Development: Exploring Opportunities for Small-holder Groundwater Irrigation in Lao PDR

Benefits of Groundwater Irrigation

- Provides cropping intensification & diversification
- On-demand irrigation (high water productivity)
- Secures production during prolonged dry spells
- Boosts livelihood and food security
- Creates employment opportunities and associated indirect benefits
- Pro-poor; makes irrigation democratic, spatially & supports private enterprise
### Country-wise Statistics on GW Irrigation

<table>
<thead>
<tr>
<th>Country</th>
<th>GW Irrigated Area (Ha)</th>
<th>Total Irrigated Area (Ha)</th>
<th>GW Irrigation Area (Ha)</th>
<th>GW Irrigation (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cambodia</td>
<td>0#</td>
<td>241,823</td>
<td>0.0#</td>
<td>0.0#</td>
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<tr>
<td>Lao PDR</td>
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<td>271,703</td>
<td>200</td>
<td>0.1</td>
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<td>Myanmar</td>
<td>100,000</td>
<td>2,073,000</td>
<td>100,000</td>
<td>4.8</td>
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<td>Thailand</td>
<td>481,063</td>
<td>5,279,860</td>
<td>481,063</td>
<td>9.1</td>
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<tr>
<td>Viet Nam</td>
<td>32,000</td>
<td>3,200,000</td>
<td>32,000</td>
<td>1.0</td>
</tr>
</tbody>
</table>

*# underestimates known levels of development*

Sources: Siebert et al., (2010); FAOSTAT, IWMI (2007)

### Development Challenges

- Little knowledge of the resource or its potential
- Limited/fragmented data
- No ongoing monitoring of GW
- Limited capacity to plan, develop or manage the resource
- Low potential / poor water quality in some areas
- High access costs or operating costs
- Lack of operational experience
An Untapped Potential in Lao PDR?

THAILAND

Groundwater irrigation in Thailand is critical to ensuring year-round commercial rice production.

LAOS

Garden-scale groundwater irrigation in Laos serves local food needs.

Role of Groundwater

Domestic supplies
Wetland & river baseflows
Industry
Agriculture
“Develop and reliably demonstrate viable technologies and identify strategies that create an enabling environment for enhanced shallow GW irrigation for supplementary wet and dry season irrigation by smallholder farmers to increase their food- and nutritional-security and livelihoods.”

Research Objectives

- Comp.1: Assess and prioritize typologies and hotspots best suited to GW Irrigation
- Comp.2: Demonstration and evaluation of on-farm pilot trials
- Comp.3: Better understanding opportunities and constraints for agricultural groundwater use
- Comp.4: Groundwater governance & policies related to the land-water-energy nexus
- Comp.5: Sustainability assessment of the groundwater use for higher productivity cropping systems
- Comp.6: Capacity building, training and institutional enhancement
Component 1: “Assessment and prioritization of typologies and hotspots most suited to the development of groundwater-based irrigation”

- Acquire data from relevant agencies & construct database
- Assessment of existing GW Potl. maps against independent data in focal areas
- Develop methodology for assessing GWP and generate final GWP maps for focal areas
- GWP Potl. maps at national scale taking account of non-hydrogeological factors

Component 2: “Demonstration and evaluation of on-farm pilot trials and groundwater resource characterization”

- Finalize field site selection and conduct field surveys
- Compilation and evaluation of existing data
- Development of farm and basin level monitoring plans
- Assess needs for further monitoring infrastructure
- Drilling of new irrigation and monitoring wells
- Conduct aquifer tests and water quality monitoring
- Implementation of the monitoring plan
- Develop and trial community-level groundwater monitoring
Component 3: “Understanding of opportunities and constraints for agricultural groundwater use”

- multi-level agrarian system analysis
- perception study on how actors view groundwater use

Component 4: “Groundwater governance, including a review of existing agricultural strategies within the broader context of water-land-energy nexus”

Policies, strategies, laws, regulations
Informal Rules and Practices

Objective
Identification of policy and institutional problems in the context of enhancement of agricultural groundwater use (with consideration of national development targets and water strategies)

Policy Review
(land, agriculture, water, energy and other relevant sectors)

Institutional Analysis (Mapping)
(land, agriculture, water, energy and other relevant sectors)

International and Regional Policy Review
(as reference cases for Lao PDR)

Analysis of the Roles of Stakeholders
(in groundwater irrigation and its promotion)
Component 5: “Sustainability assessment of the groundwater use for higher productivity cropping systems”

- Develop mathematical models based on data to describe the dynamics of the groundwater system
- Predict impacts for future scenarios of development
- Provide platform to support developing monitoring networks and management plans

Component 6: “Capacity building, training and institutional enhancement”

- Conduct a number of targeted short courses in Lao PDR
- Exposure visits draw lessons from existing projects
- Train project team to PhD and MSc levels
Main Messages

- IWRM and groundwater management are both in their infancy in Lao PDR but efforts on both fronts are underway.
- Experience in use of GW for irrigation is limited but current efforts seek to establish the actual potential.
- There is a need to build the necessary human and institutional capacity to improve climate and hydrogeological knowledge base to ensure sustainable development and effective management.

Thank you

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