

**Call for Proposal on Research Study on Ground Water Dynamics and Sustainable Crop Choices for the State of Punjab**

**Terms of Reference (TOR)**

**1. Project Background:**

Farmers in Punjab continue to follow the unsustainable paddy-wheat cycle in cultivation despite awareness of its impact on ground water. Absence of water savings practices, access to water saving technologies and incentives to diversify their crop mix has pushed farmers into making unviable choices. Centers for International Projects Trust (CIPT) and Hindustan Unilever Foundation (HUF) is implementing a project to seek solutions for responsible water use and long-term viability of agriculture in Punjab. The project aims to work with Punjab's robust farmer cooperatives to promote digital water measurement solutions for efficient paddy-wheat cultivation; financial tools to track input costs with optimum water use and economic tools to trigger large scale adoption of conscious water practices.

**2. Purpose of research study:**

Punjab is known as India's grain basket as it produces 20% of India's wheat and 9% of India's rice<sup>1</sup> with only 1.57% of geographical area. The state's contribution to the central pool is significant as it provides 60% of wheat and 40% of rice to the pool<sup>2</sup>. In the 3 decades since 1980, Punjab witnessed a spectacular increase in agricultural production focussed on paddy-wheat cropping system helping the country achieve food sufficiency.

With 83% of cultivable land under agriculture (primarily under paddy-wheat); Punjab has witnessed a significant increase in irrigation water demand. High cropping intensity of 184% and limited surface water availability fuelled high penetration of tube-wells in the state and an unsustainable dependence on ground water. Of 4.93 million ha under irrigation, 2.93 million ha is covered by tube-wells<sup>3</sup>.

Annual Ground water availability	Surface Water availability	Groundwater Extraction	Ground water over-exploited blocks	Critical blocks	Decline in level of ground water in the basin by CGWB	Stage of Ground Water Development
25.91 BCM	23.39 BCM	34.89 BCM	105 out of 138	4	4.5 to 13.5	149% - 172%

Source – CGWB 2013

Irrigation accounts for 97% withdrawal of total ground water draft resulting in depletion of levels in most parts of the state at an alarming rate. The state has witnessed depletion in ground water table in north east and north west (Majha and Doab) regions with over-exploited aquifers while the south-western part (Malwa) suffers from saline and waterlogged areas.

Crop choices and water use behaviour in Punjab cannot be ignored if the future of ground water needs to be secured for Punjab. Applied irrigation water productivity for Punjab in paddy is 0.22kg/m<sup>3</sup> as compared to more efficient states at 0.75 kg/m<sup>3</sup>. For wheat, irrigation water productivity stands at

<sup>1</sup> <http://agropedia.iitk.ac.in/content/punjab-leader-agricultural-sector>

<sup>2</sup> <http://agripb.gov.in/home.php?page=intpu>

<sup>3</sup> Groundwater Problems in Punjab: A Matter of Concern; Amandeep Kaur and Gaurav Kumar, The International Journal Of Humanities & Social Studies, Vol 2 Issue 7, July 2014

1.23 kg/m<sup>3</sup> much above the national average of 0.84 kg/m<sup>3</sup>. Low irrigation productivity indicates that each additional unit of applied irrigation water produced much smaller productivity benefits and are thus responsible for continuous and fast depletion of the groundwater resources through free or highly subsidised farm energy<sup>4</sup>. The predominance of paddy and wheat will continue to drive excessive withdrawals and provide limited recharge of the sub-surface aquifers.

Declining ground water levels will add uncertainty and costs making the pursuit of the current agrarian system unviable for Punjab's farmers. Current studies have been effective in documenting the decline of the ground water but have been limited in highlighting the syncretic relationship between crop choices, sustainable water use and ground water levels. There is a need for a comprehensive predictive assessment of Punjab's choices for the future that can restore its ground water resources while promoting responsible (and remunerative) agriculture.

### **3. Scope of work**

The purpose of the proposed study is to map Punjab's water sources for agriculture and create cogent predictive scenarios for:

#### **1. Water: Today and Future**

- a. Based on robust predictive modelling; where is Punjab headed if it continues to draw and replenish ground water as it does today?
- b. Given the hydrogeological context of the state, what are the possibilities for ground water recharge in the state? To what extent have they been undertaken?
- c. If the state had to improve rainwater conservation through surface storage; what would it need by way of resources?
- d. What gap would these efforts be able to bridge if undertaken at scale?
- e. In effect, if the state continues to use water the way it does; what will it need to invest to just maintain status quo?

#### **2. Agri-Water Nexus**

- a. What will happen if the state continues to grow what it does with current water use efficiency rates?
- b. What will happen if the state continues to grow what it does but drastically improves water use efficiency?
- c. What will happen if the state transforms its crop mix to high value (instead of high yield) crops?
- d. What would the latter entail in terms of investments, foregone state revenues, subsidies?

#### **3. Role of Incentives and Allocations in current water, crop choices**

- a. Map the state's investments, subsidies in programmes and revenue sources from agriculture
- b. Highlight budgetary choices that the state makes today that makes any shift in agriculture difficult or unviable
- c. Offer viable choices for the state to make the required shift out of paddy-wheat

#### **4. Study Deliverables:**

The proposed study must deliver clear data driven scenarios for the state and districts:

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<sup>4</sup> NABARD - Water Productivity Mapping of Major Indian Crops

- For ground water and overall water security (ground + surface) with a) status quo in current cropping patterns and b) with shifts in the crop mix towards more water responsible and remunerative crops that suit the state's agroclimatic conditions
- Feasible crop choices that can help Punjab be the architect of its next agricultural revolution
- Financial scenarios including implications for the state's finances and GDP with status quo vis-à-vis improved crop choices
- Expert reviews of the study findings to build credibility for the emerging recommendations

## 5. Timeline

The intended time frame for the entire study is a maximum of 6 months (August 30, 2020). The agency will be expected to share their preliminary findings (first draft) by August 15, 2020 and final report by August 30, 2020. The agency will be solely responsible for managing the assignment, data collection and coordination with different agency in Punjab.

## 6. Evaluation Criteria:

Proposals will be evaluated based on following assessment criteria/parameters:

### A. Project design (weightage 30%):

- Understanding of the problem, context, possible solutions and deliverables as outlined in scope of work.
- Comprehensive details on important aspects of the project including action plan for data collection, analysis and modelling, application of robust methodology, defining timeline and mapping outcomes.
- Technical approach and operational plan including proposed process for conducting the study and providing the solutions.

### B. Technical expertise (weightage-30%):

- Relevant experience of the agency in similar assignments (related to subject of water and agriculture systems, predictive modelling of water scenarios etc).
- Substantial experience in evaluation, research and documentation of similar projects.

### C. Team profiling (weightage-20%):

- Qualified organisation/agency that can put together a technical team to deliver the assignment (capacity).
- Profile of key team members (with expertise in areas of agronomy, hydrogeology, econometric modelling or allied fields) with their defined roles should be listed.
- Time allocation for study by team member.
- External consultant details to be shared (if any).

### D. Budget (weightage 20%): Provide most competitive and realistic financial proposal to cover all foreseeable expenses. Budget should include item wise expenditure plan and duration.

## TEMPLATE FOR SUBMISSION OF PROPOSAL

### Part 1: PROJECT DESIGN (WEIGHTAGE 30%)

As outlined in the scope of work (Section 3), elaborate on the understanding of the problem, possible solutions and deliverables of the study. This should include information on the action plan to be used for data collection, analysis and modelling. Additionally, share proposed methodology, define timeline and outcomes of the study. Also, share technical approach and operational plan that will be adopted for the study. **(WORD LIMIT: 1200-1500)**

### Part 2: TECHNICAL EXPERTISE (WEIGHTAGE 30%)

State your organisation's/agency's prior and current relevant experience in carrying similar projects related to subject of water and agriculture systems/agronomy/predictive modelling of water scenarios? State substantial similar experience of the organisation/agency in fields of evaluation, research and documentation. Share extract of the similar work carried and publication in any peer reviewed journal. **(WORD LIMIT: 500)**

### PART 3: TEAM PROFILING (WEIGHTAGE 20%)

List profiles of key team members having expertise in areas of agronomy, hydrogeology, econometric modelling or allied fields. Define the roles of these key team members and also, time allocated to key team members for the study. Share similar details of external consultant (if any) who will be a part of the study. **(WORD LIMIT: 500)**

### PART 4: BUDGETING (Weightage 20%)

Briefly explain the budget allocation for different activities planned in the study. Indicate how the requested financial support from CIPT-HUF would be allocated for different budget heads across the timeline. **(WORD LIMIT: 300)**

## 7. Application deadline

All proposals need to be submitted to us at [director@cipt.in](mailto:director@cipt.in) on or before **9<sup>th</sup> February 2020**.

Please mention in the subject line – “Proposal for research study on ground water in Punjab”.