



Background and objective

- ❑ Failures in theoretically and supposedly efficient and empirically proven market mechanism in **groundwater management** has led to a search for alternative arrangements. **Cooperation in water sharing** system so far showed mixed result, while government intervention through a subsidy scheme inflated successes.
- ❑ Government subsidy policies supported installation of a **community managed medium-deep tube well** in Odisha state of India to address the economic scarcity of groundwater procurement. However, its management through a **water user association (WUA)** seemed not to solve the long-standing distribution issue.
- ❑ In Odisha, around 30 % WUA are dysfunctional due to its **improper management of the groundwater resource system** and well maintenance. Moreover, reduced pumping cost for a WUA exaggerates water extraction that declines the water table and threatens its sustainability.
- ❑ **Res. Obj.** : To develop a cooperation model by linking farm level decisions at a community scale

Material and methods

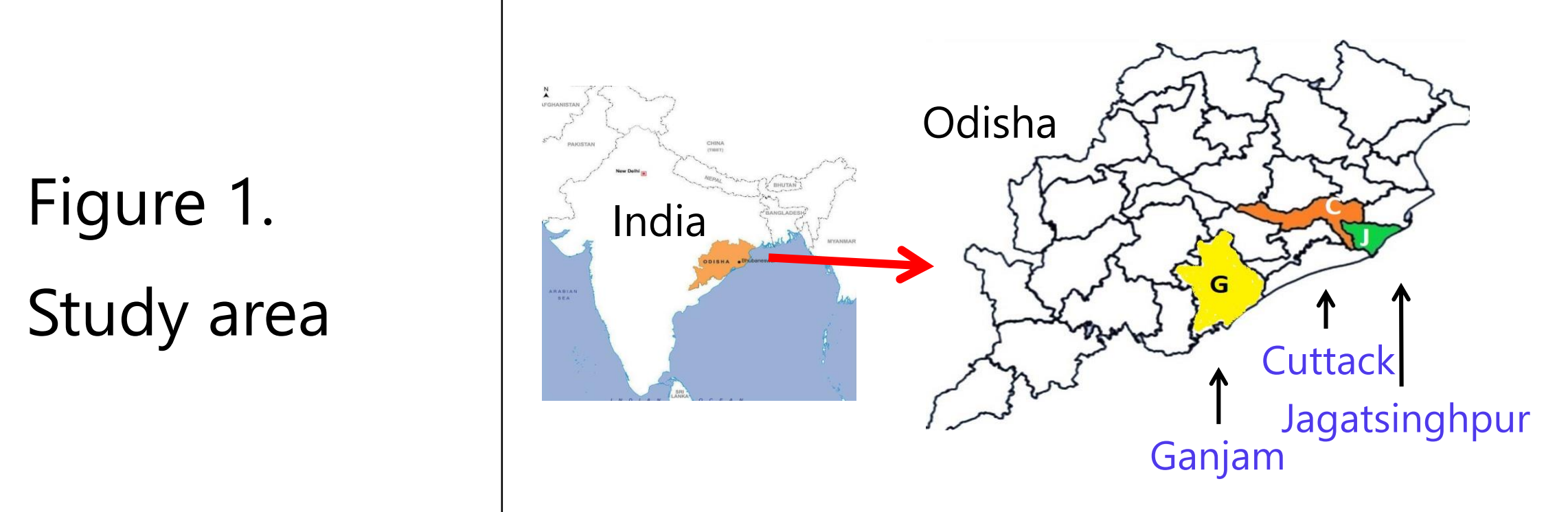


Figure 1.
Study area

- From 17 villages 53 representative farms composed of 783 farm plots availing irrigation from four major
 - **groundwater sharing system**: WUA, cluster tube well (CTW), private water seller (PW), and individually owned wells
- Research design** Information on the land use and land cover change (LULCC), irrigation provision and its usage for different
 - plot specific activities, irrigation sharing system, and decisions on crop product sale during 2018-19 crop season.
- Analytical method** ➤ A **principal-agent model** is used to save water through an **incentive scheme** (Amjath Babu, 2008).

Results

- ❑ Empirical evidence indicates that the community has **higher bargaining power** in benefit sharing after distributing the **fixed (r)** and **variable (alpha)** part of the **incentive** earned by individual member.
- ❑ Simulations through water price increase by 1.5 to 3 times (base price: INR 150 /ha-cm) do not significantly increase water saving, implying a **dominant type of cropping pattern** in the farming system.

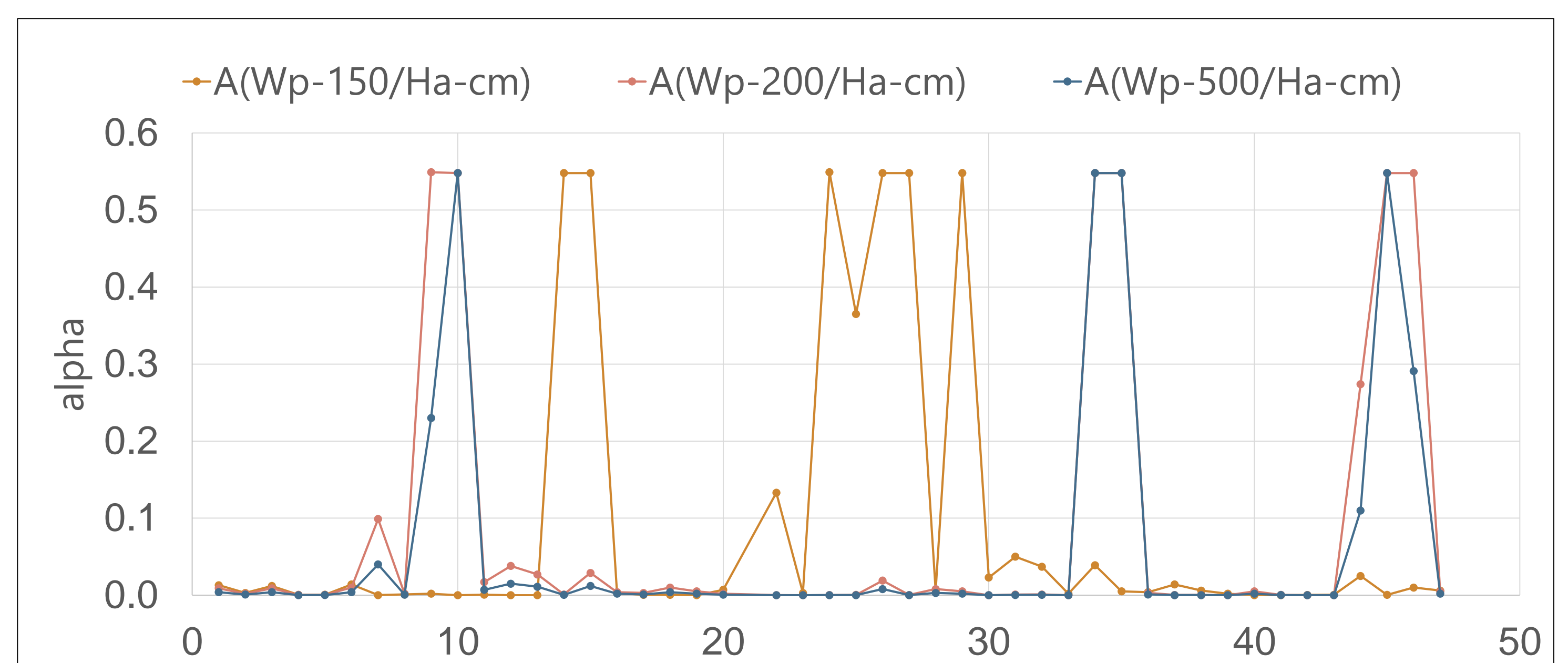


Figure 2. Values of the principal's instrument alpha at the water price of INR 150, 200 and 500 per Ha-cm



- ❑ Model simulations by the dominant farm types revealed that *highly diversified irrigated agriculture for direct market supply* (HDIAM) farms are sensitive to water price increase though they are flexible to adopt a maximum water saving cap.
- ❑ Introduction of a moderate fixed initial payment (INR 2300 per ha) increased area allocation to water saving activities, that further increased the gross margins.
- ❑ *Least diversified irrigated agriculture for contracted sale* (LDIAC) farms showed indifferent water use behaviour with any increase in water price, because of their significant acreage under perennial **water-intensive crop enterprise** (sugarcane).
- ❑ Any acceleration of water-saving incentives showed that there should be a lower redistribution of water in the second-round, due to the higher marginal value that accounts for scarcity value of water.



Conclusion

- ❑ The motive of water saving by introduction of an initial fixed payment attracted farmers to join the incentive scheme.
- ❑ HDIAM farms diversified to higher acreage under water saving activities.
- ❑ Model may show further improvement by introduction of inter WUA water sharing.

Reference

Amjath Babu, T. S. (2008). Economic and environmental impacts of political non-cooperative strategies in water management : an analysis of prospective policies in the Cauvery river basin of India. Justus Liebig University, Giessen.