

Decentralized Water Retention: Adapting Indian Watershed Models to Poland

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Keywords

Poland; India–Poland knowledge transfer; decentralized water management; *johads*; traditional water harvesting; micro-retention; groundwater recharge; participatory water budgeting; Atal Bhujal Yojana; watershed restoration; agricultural drainage; Common Agricultural Policy (CAP).

Abstract

Poland is experiencing increasing hydrological stress, including declining groundwater levels, agricultural water scarcity, flash droughts, and increasingly uneven precipitation. These challenges are compounded by a historical legacy of landscape modification and drainage-oriented agricultural water management, which has reduced the capacity of landscapes to retain, infiltrate, and slowly release water. This lecture explores whether selected decentralized watershed-management approaches developed and applied in India can offer transferable pathways for strengthening water retention and climate resilience in Polish agricultural and forest landscapes.

The analysis focuses on three interconnected principles: **distributed micro-retention, nature-based watershed interventions, and community-led water budgeting**. India's experience with traditional and community-restored structures such as *johads*, together with contemporary groundwater-governance initiatives such as the **Atal Bhujal Yojana**, demonstrates how relatively small, distributed interventions can influence infiltration, groundwater recharge, baseflow, and local water-use decisions. Rather than viewing these approaches as technologies to be replicated wholesale, the lecture examines the **underlying ecological and governance principles** that may be adapted to Poland's distinct soils, hydrology, land-use systems, institutional structures, and European policy context.

Particular attention is given to the relationship between **rainfall intensity, evapotranspiration, soil hydraulic properties, drainage infrastructure, and landscape retention capacity**. The lecture argues for a shift from predominantly centralized water-control infrastructure toward a complementary model of **landscape-scale, distributed retention**, in which water is slowed, stored, infiltrated, and reused as close as possible to where precipitation falls.

The Polish application is explored through two potential pathways: **retrofitting existing agricultural drainage systems with small retention structures**, including micro-weirs and nature-based check structures; and **embedding participatory water budgeting within local Gmina-level governance**, potentially linking farmer incentives with EU Common Agricultural Policy (CAP) instruments.

The central proposition is not that Poland should replicate Indian watershed models, but that **India's experience offers a valuable design and governance laboratory for rethinking how landscapes retain water under climate uncertainty**. The lecture therefore asks: *What can Poland learn from India's decentralized water-retention practices, and what must be redesigned for the Polish ecological, agricultural, and institutional context?*