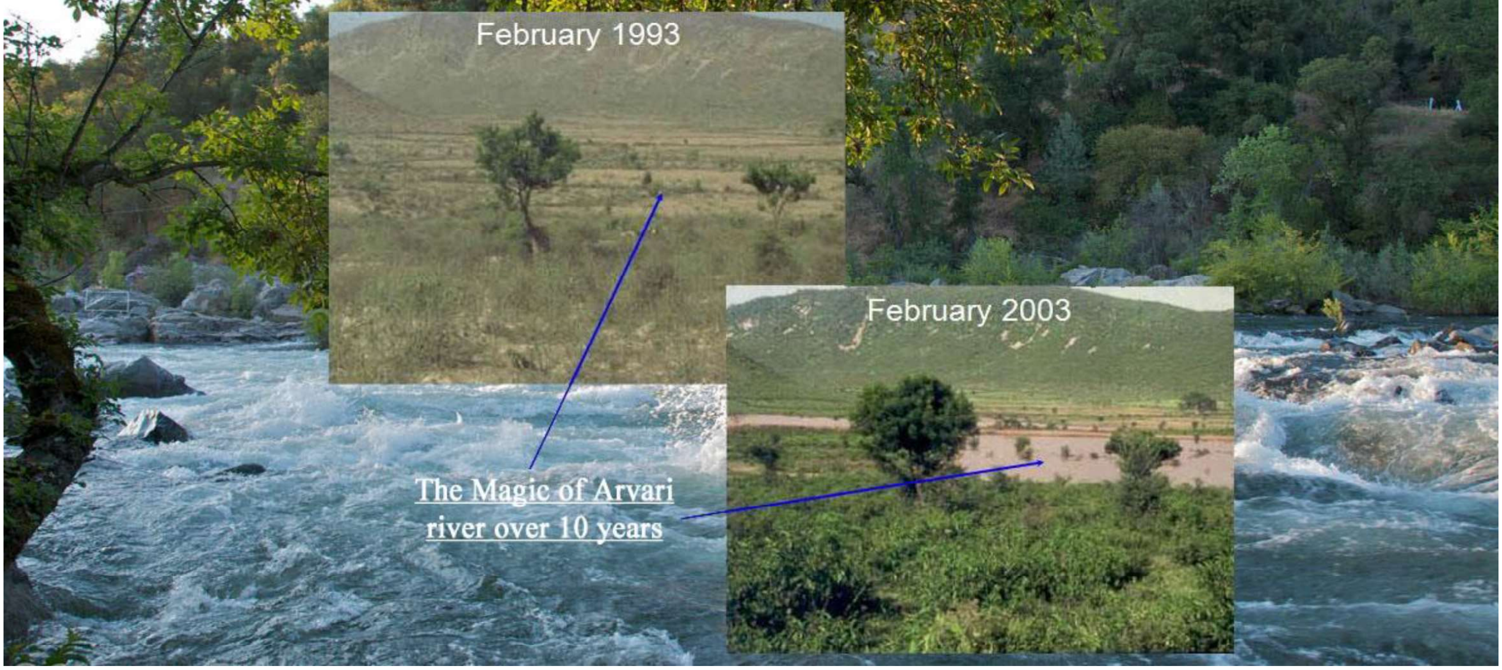

Case Study 2: RWH Impacts – Case Study of the Arvari River Watershed

A new research report titled, “Rainwater Harvesting Market – Global Industry Analysis, Size, Share, Growth, Trends, and Forecast 2017 – 2025” has been added to the comprehensive repository of Market Research Reports Search Engine (MRRSE). According to the report, the global rainwater harvesting market is likely to grow at a CAGR of over 5.70% during the assessment period 2017-2025. Rain Water Harvesting (RWH) is a long established solution adopted in arid/ semi-arid regions around the world for supply-side water management. With this growing market feasibility RWH seems to be a feasible option and has socio economic implications as well. The brief tries to evaluate and present the Arvari River Watershed (ARW) (476 km2) in Rajasthan, India, which is placed in a semi-arid region and is predominantly agrarian but suffers water scarcity during non-monsoon seasons. Since 1985, there has been significant investment in RWH in ARW involving communities and local NGOs and 366 RWH structures were built in form of Anicuts, Bandhs and Jhodas. However, rainfall is a very localised and variable phenomenon in this region. So, the RWH structures though filled up during monsoon becomes almost empty, through evaporative loss, lateral sub-surface flow and recharge. This case study analysis intends to find how effective RWH system has been in supply-side water management for agriculture in ARW.

A conceptual water balance model was built to capture the large scale watershed effects and changes in the water balance due to RWH in the ARW. The results indicate that though the RWH is a more viable system for irrigated agriculture compared to a system without RWH, sustainability sometimes decreases when the irrigated area per structure increases. A greater degree of RWH development can also decrease the social, economic and environmental marginal benefits of additional RWH structure because of low aquifer storage capacity. That means there is a limit in the area of RWH that gives maximum recharge benefit beyond which the benefit is marginal. However, the RWH structures alleviate some of the deficit in below average rainfall years through recharge of aquifers, but cannot compensate for long term drought. Moreover, as RWH leads to an increase in 'green' water used for irrigated agriculture upstream, this will affect 'blue' water availability for downstream users. The study also shows that if the supply of groundwater increases due to RWH, then local demands increase. This means for sustainability of groundwater, demand-side management as well as conflict over resources must be addressed.

For demand-side management, Arvari River Parliament (ARP) was initiated in the year 1998 with 110 representatives from 72 villages of ARW to give resource property rights to the community so that they can manage commonly owned water resources. Through this initiative, 85% of RWH structures benefited small and marginal farmers in terms of increasing irrigated area and decreasing dependency on rainfall. ARP formulised the following informal rules:

- Water-intensive crops such as sugarcane, rice, and cotton are not to be planted
- No one shall draw water from the river or RWH structures except those people, who gave their land for RWH structures or whose land is under water because of RWH.
- No commercial fishing is allowed in water stored in RWH structures
- Tube wells, which tap deeper aquifer, are not allowed
- Construction and maintenance of RWH is encouraged
- The land is not to be sold for mining/quarrying or any other industrial activity
- Protection and planting of forests in encouraged

Despite the presence of the informal rules of the ARP, unrestricted use of groundwater still occurs within the ARW. Enforcement and monitoring of the rules have been a challenge. The users are heavily dependent on the resources, however, the boundaries are not clear. Currently, the ARW is not facing serious supply issues because of fewer consumers, but as the population grows longer-term water table decline patterns could appear. In this regard, ARP should be pro-active in the demand-side management of groundwater. This also includes enabling groundwater resource users to balance their demand for groundwater in parallel with RWH construction, which must consider water balance trade-offs across the larger watershed.

(Source: Claire J. Glendenning and R. Willem Vervoort (2015), Sustainable Water Use and Management: Examples of New Approaches and Perspectives, Springer International Publishing, Switzerland.)