Using watershed development to protect and improve domestic water supplies

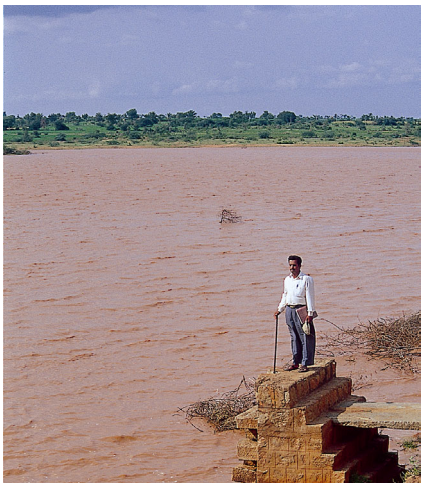
- **Do you know places where domestic water supplies are becoming more unreliable?**
- **Are you aware that intensive water harvesting and increased groundwater extraction may be one cause of this problem?**
- **Do you know also that changing the design and management of water harvesting systems can both mitigate this problem and lead to long-term improvements in your domestic water supply?**

Read on to find out how to improve the design and management of water harvesting systems.

What you need to know…

Check dams reduce the flow of water downstream

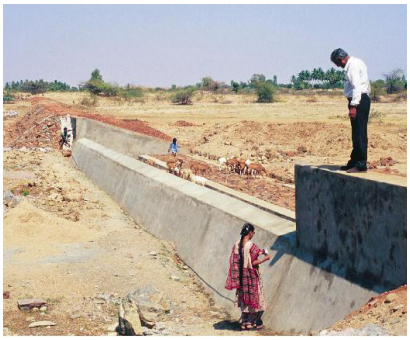
Check dams and other water harvesting structures have been used very successfully to harvest water that would have otherwise have run downstream. A large proportion of this harvested water infiltrates into the ground and is subsequently extracted from underground aquifers using borewells and open wells. In most cases, extracted water is used to meet the high demand for irrigation water. Although the reduction in downstream flow of water caused by individual check dams and other structures is generally quite small it can become significant if the density and/or storage capacities of check dams and other structures are high.



Domestic water supplies are adversely affected whenever reduction in downstream flows starts to impact negatively on recharge to the aquifers that are important sources of domestic water supply. In some cases, tanks are important sources are vitally important sources of perennial recharge to aquifers that meet demands for domestic water. In other cases, it may be check dams and other structures or the water courses themselves.

Groundwater drought

Dramatic increases in groundwater extraction in recent years has lowered groundwater tables and made it more difficult for communities to cope with the shock of drought. When a groundwater drought occurs in the vicinity of a village, the villagers have to travel longer distances to fetch drinking water. Or they have to rely on water tankers as their main source of supply. In general, groundwater droughts are caused by a combination of physical and human factors (e.g. a period of below average rainfall and unsustainable levels of groundwater extraction).



Other factors that affect domestic water supplies

As population increases and people use more water, demand increases, putting more pressure on sources of water supply and especially drinking water supply systems. Wastage of water in villages as a result of leaking taps or careless use of water can be another cause of water shortages. Deteriorating water quality as a result of natural, industrial or urban pollutants can also leads to problems.

Box 1 Impact of water harvesting structures on tank inflows

Battuvani Palli tank located in Anantapur District has a catchment area of 1145 ha and a capacity of 61 ham. In the last 20 years, 15 water harvesting structures with a total capacity of 15 ham have been built in the tank catchment area. Each of these may fill once or more a year.

These structures have reduced the frequency of tank spills from once every 5 years to once every 10 years. In average rainfall years, 40% of runoff is now retained by the structures and 60% flows into the tank. In low rainfall years, however, 75% of runoff is retained by structures and only 25% flows into the tank.

Hence, tank inflows and associated groundwater recharge have declined dramatically in the dry years when the demand on the domestic water supply is at its highest. Recognising that the tank is the most important source of recharge for their new village water supply, the villagers have taken action (see Box 2).

How do you know if a village water supply is being affected by intensive water harvesting?

If a tank or other structures are the cause of a domestic water supply, it is easy to recognise the symptoms:

- Increased frequency of water shortages due to borewells drying up (as opposed to breakdowns, power cuts, etc)
- Increased number of months the tank or structures are dry
- Reduced frequency of tank spills

What can you do?

To improve or maintain inflows to tanks or structures and groundwater recharge:

- Install gates on larger check dams and other structures, and keep them open at the start of the rains to ensure flow of water to tanks or structures that are important sources of "domestic water" recharge. This is particularly important during or following low rainfall years.
- Clear feeder channels
- Desilt the beds of tanks and structures to increase their capacity and reduce evaporation losses
- Repair sluices and bunds
- Regulate the number of additional structures to be created in the catchment area, through Panchayat resolutions.

To improve drinking water supply:

- Reduce wastage of water in the village, by repairing leaking taps, timely O&M, etc.

- Adopt village-level water management practices that give highest priority to protecting domestic water supplies, in order to ensure that "groundwater" droughts do not occur. These include village-level monitoring of groundwater status, particularly near domestic water sources
- Spacing norms. Ensure that no irrigation wells are located with 250 m of domestic-supply wells
- Adopt roof water harvesting and other measures to conserve water.

Box 2 Improving tank inflows

To improve their domestic water supply, Battuvani Palli villagers have fitted gates to large water harvesting structures in the tank catchment area.

These will be left open during the early part of the monsoon so that runoff goes straight to the tank, helping to recharge domestic and community water sources. The gates will be closed once the water in the tank reaches an agreed level.

After the gates are closed, subsequent runoff is harvested and used primarily for agricultural purposes.

Box 3 Some common myths

- **Rainfall has reduced** Some villagers believe that tank inflows have reduced because rainfall declined. However, detailed analysis of rainfall statistics does not show a decline in rainfall in southern AP
- **Deforestation reduces runoff.** Some people believe that cutting of trees in the tank catchment area has decreased runoff. Research studies worldwide, however, show that deforestation is more likely to increase tank inflows.
- **Runoff is 30-40% of annual rainfall.** However, Central Water Commission figures show that mean annual runoff at the macro-watershed scale in southern AP is only 2-8% of mean annual rainfall.

Summary

Water harvesting structures bring many benefits in semi-arid areas. But intensive water harvesting can sometimes make domestic water supplies more unreliable.

This negative impact can be mitigated easily by installing gated water harvesting structures and by adopting specific management procedures that ensures that runoff in the early part of the monsoon season is concentrated wherever it can best recharge aquifers that meet domestic water needs.

For more information please contact:

Y V MALLA REDDY
Accion Fraterna
Anantapur
Andra Pradesh, India
Tel: 08554 246660
actionf@sancharnet.in

or see WHIRL project website at

www.nri.org/whirl

WHiRL

The WHiRL project is supported by the UK Department for International Development (DFID) through the Knowledge and Research programme. Project R7804 'Integrating drinking water needs in watershed projects'.