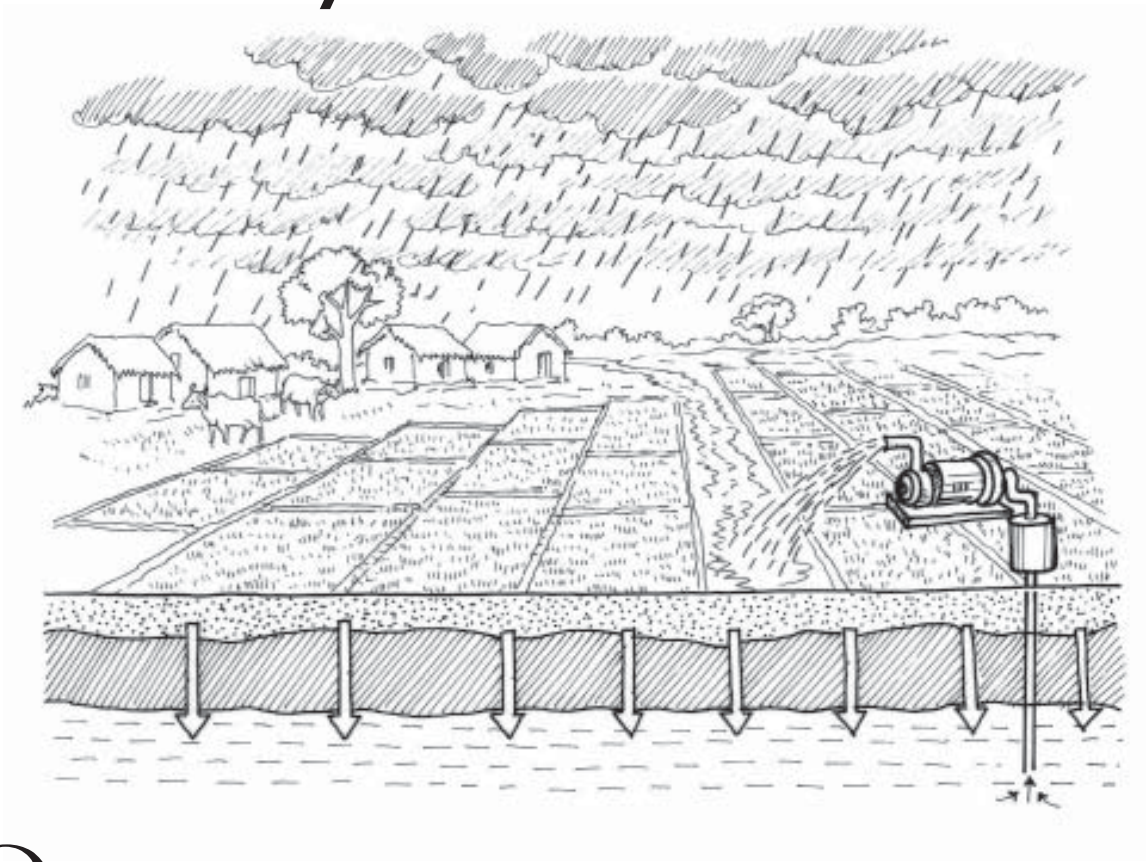
Saving Water and Increasing Water Productivity



Obtaining more benefits from each drop of water consumed will be the key to overcoming scarcity. When the saved water is transferred to beneficial use for more agriculture, protection of environment, or urban use, an increase in water productivity is achieved.

There are various ways of conserving water and increasing its productivity. They generally form four major categories:

- **Beneficial depletion**
  This takes place when water is depleted but for beneficial uses such as evapotranspiration from crops, use and evaporation of water for drinking, or evaporation and transpiration from wetlands.
- **Non- or less-beneficial depletion**
  This takes place when the depletion of water leads to very little or negatively perceived benefits such as evaporation from fallow lands, or evaporation from stagnant water, or flows into seas in excess of environmental requirements.
- **Uncommitted outflows**
  These are flows in rivers, or groundwater out of a stretch of a river basin in excess of downstream human or key environmental needs.
- **Committed outflows**
  These are outflows from a reach in the basin necessary to meet downstream water rights or requirements, or important ecological needs.

General Means of Saving Water

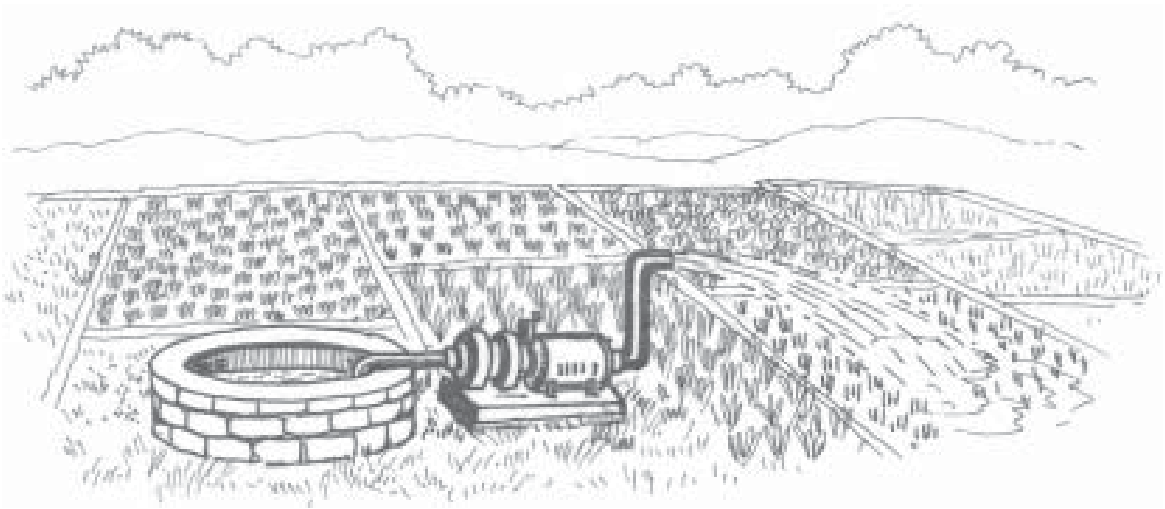
Water is saved when it is possible to reduce negative, non-beneficial, and low-beneficial depletion, and reduce uncommitted outflows either through improved management of existing facilities or through the addition of facilities for water control, storage or saving.

In certain situations, the societal preference of water may be to a use that produces less agricultural output, but benefits disadvantaged groups. It may be more cost-effective to reuse water through pumping from drains or groundwater than to modernize existing infrastructure to increase the beneficial depletion of water.

General Means of Increasing Water Productivity (Without Water-saving Measures)

The productivity of water is enhanced by increasing the productivity per unit of process depletion (crop transpiration in agriculture) or other beneficial depletion, and by reallocation of water to higher-value uses.

The strategy chosen for increasing water productivity will be guided by economic and social factors. Existing water rights will often constrain choices. Local availability of water may be an important consideration dictating irrigation strategy, while developing strategies, cost-effectiveness and social goals must be considered.



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How to Increase Productivity Per Unit of Water Consumed

The productivity of per unit of water consumed can be increased by the following means:

- **Crop substitution** — by switching from high water-consuming crops to less water-consuming crops, or switching to crops with higher economic or physical productivity per unit of water consumed.

- **Changing crop varieties** — to new crop varieties that can provide increased yields for each unit of water consumed, or the same yields with fewer units of water consumed.
- **Deficit, supplemental, or precision irrigation** — with sufficient water control, higher productivity can be achieved using irrigation strategies that increase the returns per unit of water consumed.

- **Improved water management** — to provide better timing of supplies to reduce stress at critical crop growth stages, leading to increased yields, or, by increasing water supply reliability so farmers invest more in other agricultural inputs, leading to higher output per unit of water.
- **Improving non-water inputs** — in association with irrigation strategies that increase the yield per unit of water consumed, agronomic practices such as land levelling and fertilization can increase the return per unit of water.

Reducing Non-Beneficial Depletion

It is possible to lessen the non-beneficial depletion of water by:

- reducing evaporation from water applied to irrigated fields through specific irrigation technologies such as drip irrigation, or agronomic practices such as mulching, or changing crop planting dates to match periods of less evaporative demand;
- reducing evaporation from fallow land, decreasing the area of free water surfaces, decreasing non-beneficial or less-beneficial vegetation, and by controlling weeds;
- reducing water flows to sinks through interventions that reduce irrecoverable deep percolation and surface runoff;
- minimizing salinization or return flows through saline soils or through saline groundwater to reduce pollution caused by the movement of salts into recoverable irrigation return flows;
- shunting polluted water directly to sinks to avoid the need to dilute with freshwater; and
- reusing return flows.

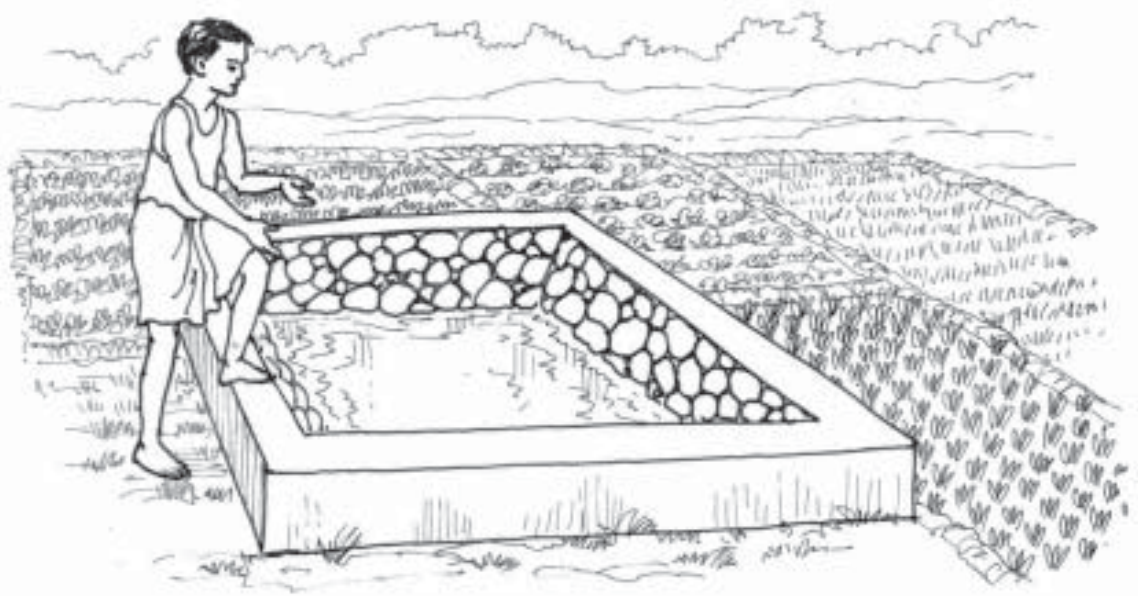
Because downstream commitments may change, reallocation of water can have serious legal, equity and other social considerations that must be addressed.

Reallocating water from lower-value to higher-value uses will generally not result in any direct water savings, but it can dramatically increase the economic productivity of water.

Tapping Uncommitted Outflows

Uncommitted outflows can be tapped through the following means:

- **Improved management of existing facilities** — to obtain more beneficial use from existing water supplies. A number of policy, design, management, and institutional interventions may allow for an expansion of irrigated area, increased cropping intensity, or increased yields within the service areas. Possible interventions are reducing delivery requirements by improved application efficiency, water pricing and improved allocation and distribution practices.
- **Reusing return flows** — through gravity and pump diversions to increase irrigated area.
- **Adding storage facilities** — so that more water is available for release during drier periods. Storage takes many forms, including reservoir impoundments, groundwater aquifiers, small tanks, and ponds on farmers' fields.



Adapted from:

Molden, D., R. Sakthivadivel and Z. Habib. 2001. Basin-Level Use and Productivity of Water: Examples from South Asia. Research Report 49. International Water Management Institute, Sri Lanka.

Corresponding author:
David Molden