



Briefing Note

Water-saving irrigation

The background

Within the field of irrigated agriculture, efforts to save water have so far focused above all on increasing the efficiency of water use. This means using the largest possible proportion of the water withdrawn from rivers or groundwater for supply to the crops being grown. Three principal ways to achieve such increases in efficiency are generally put forward. The first involves technical modernisation when building new irrigation systems or refurbishing existing ones. The second calls for improvements in the supply of water to the plants in the field. This focuses in particular on water-saving technologies, the foremost of which is drip irrigation. The third option is to increase the level of water charges – which are usually very low – as an incentive to save water and ensure that infrastructure is maintained.

Up to now, however, success has been limited, because insufficient attention has been paid to key aspects of the situation.

Our position

In this context, GIZ takes the following positions:

1. It is not enough to look at individual farms

In future, efficiency appraisals will need to focus more closely on water productivity increases, in other words on achieving higher yields or greater value added per unit of water used. This applies not only to individual farms but also to water use in an entire river basin. Improvements can be attained in various ways. From the standpoint of individual irrigated farms, technical and technological modernisations and improvements to the supply of water to the plants continue to be important steps. Optimising the timing and the extent of water application is also a significant factor, as is the choice of seed, which can shorten the envisaged cropping period. From the perspective of the individual farm, such measures automatically result in a saving of water. From the perspective of the catchment area, efficiency improvements of this type are necessary conditions for water savings, but not sufficient in themselves. There is also a need for institutional structures and mechanisms that ensure that these savings are to the benefit of general water resources and therefore also other users. Specifically, this means that clear regulations on the withdrawal and allocation of water have to be in place, but also ways of enforcing them.

If irrigated agriculture is to play a part in limiting water scarcity, the necessary institutional capacities have to be created, and must also be supported by the water users.

When used correctly, water-saving technologies – especially drip irrigation – enable the amount of water withdrawn to supply a particular crop to be significantly reduced. However, this does not necessarily result in an individual farm using less water: while continuing to withdraw the same amount of water, farmers can either expand their growing area or grow crops that need more water.

They do not have any actual incentive to save water. If water resources are to benefit from the savings made, the amount of water withdrawn must be reduced in line with these savings. The use of modern technology can therefore only result in real water savings across a large number of farms if the water users' existing water rights or habits can be modified or adapted. If the institutional capacity to enforce this is lacking, it is unlikely that many savings will be made. This has proved to be the case in practice. In Spain, Tunisia and parts of the USA, for example, water-saving technologies have resulted in the over-exploitation of water resources.

In developing countries with weak institutional structures it is therefore only in exceptional cases that such technologies can contribute to a reduction in water use across farms in general.

2. Political determination is needed when introducing water pricing

If a system of water pricing is introduced and enforced on the basis of the amount of water withdrawn, this can make a major contribution to cutting water use in agriculture. That said, the scope for implementation in developing countries is frequently overestimated. Firstly, there are significant technical and organisational difficulties associated with installing and monitoring water meters in irrigation systems used by small-scale farmers. Secondly, considerable institutional capacity and political determination is needed to enforce economically appropriate water prices and organise the collection and use of the fees. In connection with the irrigation of small farms, there are often better prospects of success if local self-governing mechanisms are used that are based on social control and mutual responsibility for common property resources.

3. Water allocation and water use must be transparent

A lack of transparency with regard to water allocation and use, and the inefficiency associated with such circumstances, creates opportunities for corruption in water allocation. Increasing transparency and accountability in the management of irrigation systems can yield significant efficiency gains and water savings.

4. Use plants and farming methods appropriate to the site

Plant breeding and crop-growing practices will continue to have an important part to play in terms of water productivity and water savings in irrigation. Apart from crop rotation, the choice of crops is also particularly important: it is crucial to select those best suited to water availability and soil conditions.



Our recommended actions

The most important areas in which international cooperation should take action are: increases in efficiency combined with adaptation of water withdrawal rights, the utilisation of results achieved in agricultural research, and improvements in water storage and in the use of marginal water resources.

GIZ considers the following the most important recommendations for action:

1. Adapt water withdrawal rights

If water savings are to benefit not only the individual farm but also water resources in the catchment area as a whole, adaptation of formal or informal water withdrawal rights is essential. Without such adaptation, individual farmers can gain the capacity to prevent reusable water from being returned for use by downstream users, thus altering the de facto allocation of water.

In irrigated agriculture in developing countries it is rare for the impacts of efficiency improvements on water resources in the catchment area to be analysed and evaluated. Such analysis will in future become increasingly important. As part of this process it is necessary to define the conditions – with regard to institutions and in particular with regard to water law – that must be in place if such improvements are to increase water availability in the catchment area. Studies of this type must become a constant component of regional water balances.

2. Make greater use of advances in breeding

Progress in agricultural research must be conveyed by advisory and extension services to a greater extent than before, otherwise farmers will not be able to make use of it. This might include more detailed knowledge of the possible uses of traditional varieties, for example, or opportunities to grow new varieties, such as those with increased salt tolerance, or improved crop-growing practices that help save water. In the context of such innovations it will be important in future to focus more closely on the different local conditions and needs of small-scale irrigation management. This applies in particular to Africa.

3. Make unused water resources available

In light of increasing problems with water scarcity, it is becoming more and more vital to make use of hitherto unused precipitation runoff and of what are considered marginal water resources such as municipal wastewater, drainage water and brackish water. Special attention should therefore be given in future to storing the runoff from heavy rainfall and floods and to making use of the harvested water. In irrigation for small farms, greater significance will be attached to the use of small private rainwater collection tanks and larger communal storage facilities. In this regard, too, it is important not to lose sight of the impact on water availability in the catchment area, especially as the number of such reservoirs increases.

Contact

Dr. Elisabeth van den Akker
 E Elisabeth.Akker-van@giz.de
 T +49 61 96 79-1414
 I www.giz.de

Published by:
 Deutsche Gesellschaft für
 Internationale Zusammenarbeit (GIZ) GmbH
 Division Rural Development and Agriculture

Dag-Hammarskjöld-Weg 1-5
 65760 Eschborn, Germany
 T +49 61 96 79-0
 F +49 61 96 79-11 15
 E info@giz.de
 I www.giz.de

February 2013