

In this issue, Charles Batchelor and S. Vishwanath discuss the following statement:

**'Water harvesting is a benign technology'**

*Dear Vishwanath,*

Breaking with tradition, the Editor has asked me to go first in this Crossfire, even though I am opposing the statement. The reason is that the arguments in favour of the statement are so well known that they do not need to be restated. To be frank, it is a strange feeling to be contesting this statement given that I believe that water harvesting is benign in many, possibly most, circumstances. Also, it almost goes without saying that water harvesting can and does bring significant benefits to large numbers of people in the form of improved domestic water supplies, improved yields from rainfed cropping and increased access to irrigation water.

Of course, it can be argued that water harvesting is a benign technology if it is carried out on a small scale or if it is considered in complete isolation to wider water resource management. However, when considering large areas of semi-arid India, I feel that it is no longer possible to regard water harvesting as being entirely benign. Water harvesting, both on farmers' fields (e.g. contour bunds, farm ponds) and along drainage lines (e.g. check dams), has been promoted and funded on a massive scale as an integral part of watershed development programmes. The unintended consequence has been that water harvesting coupled with high levels of groundwater extraction and increased agricultural water use in upstream areas has led to downstream water shortages and a reduction in the utility of tank (i.e. reservoir) systems. Not surprisingly, this problem is most severe in years with low rainfall and low surface runoff, when water harvesting at the micro-watershed scales or greater (e.g. scales of more than 500 ha) comes closest to 'harvesting every drop where it falls'.

Intensive water harvesting is contributing to a decline in the utility of tank systems, and this is giving rise to much concern in southern India in part because large amounts of funding are being allocated to tank rehabilitation projects. Village tanks are small reservoirs that range in storage capacity from a few thousand to a few million cubic metres. They are a traditional form of water harvesting that have played an important role in maintaining rural livelihoods in the semi-arid areas of southern India. Until recently they provided a reliable source of water for such activities as irrigation, watering livestock, washing clothes, bathing and fishing. They are often used during festivals and they can be an important perennial source of groundwater recharge for aquifers that support village water supplies.

So in conclusion, my main reason for contesting this statement is that under some circumstances there are negative tradeoffs associated with rainwater harvesting. Or put more succinctly, the benefits of rainfall harvesting can come at a significant cost to other water users and to the environment. Most importantly, it is my view (and the view of others who have been researching this problem during the last 5–10 years) that there is significant scope for improving planning processes so that the negative tradeoffs associated with water harvesting are avoided or at the very least mitigated.

*Best regards,  
Charles*

*Dear Charles,*

At the risk of, as you rightly put it, restating arguments that are well known, let me state the case for rainwater harvesting. Water harvesting is a benign technology. In so far as rooftop rainwater harvesting goes, it is clear that the technology which provides supplemental or complete water of fairly high quality at the doorstep is a benign technology. This technology is being implemented in two-and-a-half million households in China, one million in

Brazil, and many in Thailand, India and Sri Lanka, especially in rural areas. It is also being realized that, in urban areas, rainwater harvesting is a form of flood control through detention and retention in addition to providing supplemental water and recharging groundwater. Water harvesting is entirely benign with positive externalities.

Your major concern as I understand it is the upstream–downstream debate. Watershed management through contour trenching, field and contour bunds, farm ponds, check dams, gabions impounding water in the catchment can apparently deprive downstream 'tanks' from filling up. Is this the real problem? I would argue that it is encroachment on the catchment (mostly by those who also have land in the command area of the tank), the bad maintenance of feeder channels and tanks themselves and the overexploitation of groundwater to feed water-intensive crops that is the key problem, especially in the Indian context.

This also brings to mind the question of entitlements. What is the water entitlement of a growing population forced to move into catchment land for many reasons? Aren't they entitled at least to the rain that falls on it? How have farmers who have rainfed land to manage? Do they have any other choice? Are the 'downstream' people entitled to the water that falls on their land or houses as well as the water that falls on catchments upstream? Is disturbing the entrenched status quo entirely negative?

Having said that, one has to agree that a good water harvesting design has to take into consideration community entitlements downstream, especially of the disempowered and their livestock, before appropriating all the water on land. Therefore, as with anything else, too much of a good thing can be bad. In an (in?) famous quote 'Guns do not kill people, people kill people'.

*Yours,  
S. Vishwanath*

*Dear Vishwanath,*

By raising the matter of whether or not guns are a benign technology, you may be helping me make my case. I have always struggled with the statement 'Guns do not kill people, people kill people'. After all, it is pretty obvious that guns do not walk around shooting people by themselves any more than contour bunds and check dams cunningly construct themselves.

The gun lobby in the USA and elsewhere uses the logic that: (1) there is a clear separation between a technology and the users of a technology (i.e. guns are benign when they are in a cupboard but potentially harmful when they are in the hands of people) and (2) a technology is benign unless it is used incorrectly. If we apply gun-lobby logic to water harvesting activities, the core of the debate is whether or not water-harvesting technology can in some way be separated from its users.

My view is that any attempt to make this separation is disingenuous not least because a major success of water harvesting programmes in India in recent years is that they have become increasingly participatory and people-centred. The result is that there is no longer the distinction between the technology and the users that might have been the case when water harvesting activities were being implemented as a technical quick fix almost entirely by contractors on behalf of government departments or agencies. If we agree, as we appear to, that water harvesting activities have the potential to cause downstream problems, I suggest that we must also agree that water harvesting technology is not always benign.

Moving on to other points in your letter, I agree that 'bad maintenance of feeder channels and tanks themselves and the overexploitation of groundwater to feed water-intensive crops' also contribute to increased capture of water and higher rates of evaporation in tank catchment areas. However, there are many other activities, including water harvesting, that contribute to agricultural intensification and increased water use in tank catchment areas. It is difficult to disaggregate the contributions of the various activities to reducing tank inflows, but the views of many downstream communities and the findings of research studies are that

intensive water harvesting is a major factor, particularly when large volumes of additional surface-water storage are created in tank catchment areas.

With regard to access and entitlements to water, I have no problem with the fact that water-harvesting programmes disturb the status quo. After all, there are few pristine watersheds (in India and elsewhere) in which the pattern of access has not been affected in some way by human activity. This said, the problem with most watershed development programmes is that water-harvesting activities are aimed primarily at increasing agricultural productivity. Very little consideration is given to the potential impact of these activities on spatial and temporal patterns of access and entitlements to water for, say, domestic use, poverty alleviation or aquatic eco-systems. One reason for this state of affairs is the widespread misconception that runoff in semi-arid areas is 30–40 per cent of annual rainfall and, hence, that water harvesting catches water that otherwise runs to waste. The simple fact, which is supported by the observations that tanks no longer spill and data from gauging stations, is that many catchments in semi-arid India are now effectively closed in all but the highest rainfall years. As such, water harvesting is not a win-win option but one that potentially has negative trade-offs associated with it.

Finally, I would like to end on a point on which I hope we may agree. In areas with high-levels of competition for water, water harvesting activities should be designed as part of a transparent political process that takes into account the competing demands of different users at a range of scales (e.g. from the micro-watershed up to the large river basin). Water harvesting clearly has a very important role to play in improving access and entitlements to water for different uses in rural and urban areas. However, decision-makers at all levels need a higher level of awareness of the fact that, when used intensively, water harvesting can result in negative externalities that may be socially, politically or environmentally unacceptable. As you said 'too much of a good thing can be bad'.

*Yours,  
Charles*

*Dear Charles*

To take this argument forward, I will avoid guns! The 'tanks' that you mention – manmade reservoirs unrelated to armaments – were the first means of water harvesting for agricultural purpose in semi-arid India. It is argued, for instance, that even desilting tanks has a downstream impact on water entitlements, and has been stopped as an intervention by a tribunal adjudicating water in one of India's more contentious river basins. In the historical continuum, tanks were the first water-harvesting structures on land. The same continuum looked at field-level water and soil conservation measures too, like field bunding, sand mulching, farm ponds to mention just a few water-harvesting measures.

Every intervention, however small, will have an impact downstream. It is therefore 'the greater common good' that should determine interventions relating to fought-over water. Dams have their share of controversy; so will water harvesting.

I would like to think that harvesting the evaporation component of rain and not tampering with either surface flows or percolation could be the way forward for water harvesting. As Charles says, the management of 'green water' to the benefit of the small and marginal farmers in rainfed lands through water harvesting, will need to be done from a background of knowledge and deeper understanding of the system and its impacts, and not as a sort of 'romanticized' intervention based on rhetoric and slogans.

In the end I will quote and agree with you: 'I believe that water harvesting is benign in many, possibly most, circumstances. Also it almost goes without saying that water harvesting can and does bring significant benefits to large numbers of people in the form of improved domestic water supplies, improved yields from rainfed cropping and increased access to irrigation water'.

*Yours  
Vishwanath*

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