STRIVER POLICY BRIEF

Strategy and methodology for improved IWRM
- An integrated interdisciplinary assessment in four twinning river basins

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Water valuation and pricing – when are they useful in water management?

What do economic valuation surveys tell us about the value of water? What don't they tell us? When is water pricing part of the solution to water scarcity?

The STRIVER Policy Brief series translate the results from the EC FP6-funded STRIVER project into practical and useful information for policy makers and water managers

Water valuation and pricing – when are they useful in water management

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What do economic valuation surveys tell us about the value of water? What don't they tell us? Is water pricing part of the solution or the problem? Willingness to pay studies are only relevant as a method of assessing pricing reform, if price reform itself has a chance of success. In the present context of relatively dysfunctional water management in the Tungabhadra River Basin, economic valuation of willingness to pay for water can play a more limited role. It can flag the revenue raising potential of a well-functioning irrigation infrastructure, and can lend statistical support to the argument that farmers' water use is in fact efficient within the existing institutional set-up. Scenario analysis can be combined with valuation in what are called choice experiments. Choice experiment results show that farmers would continue to act in their own self-interest if volumetric pricing were introduced *as a consequence of* improvements in irrigation infrastructure. The difference is that self-interest would be more water conserving. Photo cover: David N. Barton and Mai Simonsen

References

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The potential of irrigation water pricing reform in Karnataka State

During the 1990's command irrigation costs in Karnataka State more than doubled, while receipts increased by less than 25%. By the end of the 90's the cost recovery rate had fallen to 0.9%. In July 2001 Karnataka State almost doubled water rates per crop area. The highest rates are at present are 988.45 Rs/ha (sugarcane), 247.10 Rs/ha (rice), and 86.50-148.25 Rs/ha (dry land crops). Economists estimated that to recover the entire irrigation expenses in Karnataka, average water rates of around Rs 2500/ha would be needed, or an average Rs 734/ha if only maintenance and establishment costs were to be covered (assuming full recovery rates). A scenario analysis showed that a yearly increase of water charges by 20% over 5 years, with annual inflation adjustments, and a 20% reduction in staffing costs, would let the water sector generate a surplus within 10 years. The scenario would allow for an increase to 50% in revenue sharing with Water User Associations. Source: Raju and Amar Nath (2001)

Introduction – the context of valuation and pricing

Whether water pricing is considered an effective tool in water management, and whether surveys on valuing water are considered useful depends on the framing of the water management problem. Economists Raju and Amr Nath(2001) summarised the main constraints to efficient irrigation water management in Karnataka in the following way:

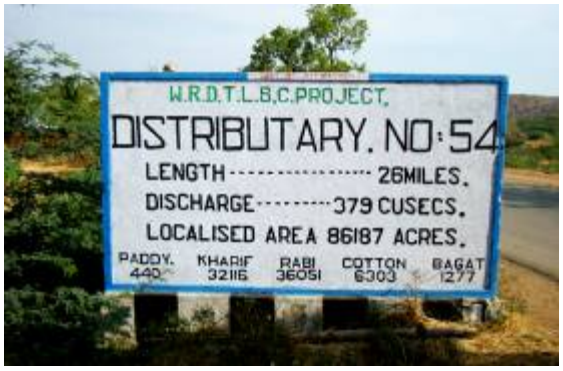
1. Inability in present context of field officers to guarantee supply quantities and timeliness at both distributary and sub-distributary levels, due to:
2. Poor water service mentality and skill levels in Irrigation Department
3. Insufficient spending on operation and maintenance, with reductions in canal capacities of up to 50%.
4. Lacking coordination between Irrigation field officers and Revenue Department officer in revenue raising at village level.
5. Lacking transfer of responsibilities and benefits to users through participatory management (despite the large number of WUAs created in recent years)
6. Irrigation Department purview focused solely on irrigation. Lack of rule making and enforcement by Water Resources Department
7. Lacking guidelines to resolve conflicting demands between domestic, industrial and agricultural needs.
8. No punishment for default on water charge payments
9. Low capacity to charge and low willingness to collect
10. Inadequate information to farmers on water arrival time and quantity
11. *Inadequate databases on plot-wise irrigation and sources*
12. *Inadequate water rates to cover total water service expenses*

What is notable about this list of water woes is that economic valuation as a tool for determining feasible prices only speaks to the last of a long list of limitations. Representative surveys of farmer cropping patterns and water use address the need for updated information on irrigation water demand. Survey-based Information on willingness to pay (WTP) water chargess of farmers is relevant for points 7-9, subject to limitations discussed in this policy brief. Another feature of the list of problems is that they cannot be addressed individually, as one reinforces the other. Economists argue that the usefulness of valuation for setting prices, and of prices as tools for water management, lies in there being an

Willingness to pay, capacity to pay, capacity to charge and willingness to collect

In practice farmers are paying more than the official water rates, but most of payment goes to payment of water bribes (what economists call transaction costs). Earlier willingness to pay studies in several states have indicated that farmers are willing to pay 3-4 times current rates if water is assured both on time and in quantity. The same studies have shown ground water buyers also paying 3-4 times the canal water rate (Raju and Amar Nath, 2001). Our choice experiments on willingness to pay per irrigation from Tungabhadra support these findings, but also show very large variation depending on location, crop type, and farmer participation in formal and informal water institutions (See STRIVER Technical Briefs, Barton et al. 2008a, b).

institutional setting where prices can work as incentives for water conservation and allocation of water to the most valuable use. This in itself requires an appropriate institutional setting, with e.g. clear definition of water rights.



Timely information about cropping pattern and water demand? Photo: David N. Barton

However, there may be disagreement on whether economically efficient allocation of water is a priority water policy objective in areas with high scarcity and poverty. Other formal or implicit objectives may be guaranteeing minimum water rights for domestic users, allocating water to poor farmers as a form of income support, or allocation to the highest briber by rent seeking by officials. Others argue that economic valuation methods are a poor basis for price setting because they don't quantify the social values of water that are not related to agricultural production.

What do economic valuation surveys tell us about the value of water?

What do valuation surveys actually measure? They are based on observing what farmers say they do, rather than what they do. Effort is put into asking questions where the farmer has little incentive to give false information, but there will always be a difference between WTP responses in a survey evaluating a future scenario and what farmers currently pay. Surveys can use random sampling to get a representative picture of the characteristics of water use (e.g. cropping patterns), how much water they currently use (based on farmers' survey responses), as well as farmers opinions on water policy scenarios.

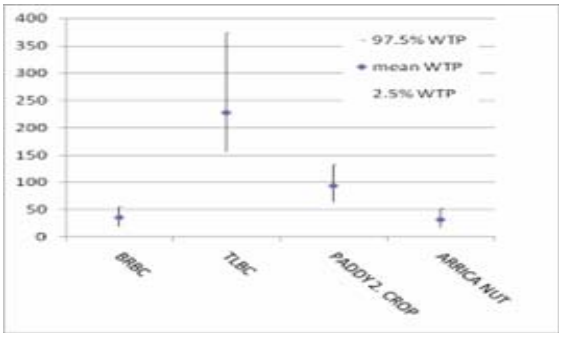


Figure 1 Willingness to pay for an additional irrigation in Rabi season, implied by farmer choices between a number of water pricing and supply scenarios.

An important question to ask before commissioning a survey is whether this information is likely to be more or less accurate and representative than other types of information on water use and attitudes that the manager has access to.

Common to economic valuation studies is that they estimate water users wiilingness to pay based on answers to hypothetical questions about future pricing scenarios. A method called contingent valuation asks willingness to pay directly given some proposed increase in for example water availability. These studies have been criticised because water users can give strategic responses trying to influence the outcome of the survey, or simply answer trying to second guess or please the surveyor. Many alternative ways of asking willingness to pay questions have been tried in an attempt to get closer to what water users would actually pay if given a real choice. The latest approach, called choice experiments, was tried in the Tungabhadra river basin. Farmers were asked to choose between a number of scenarios where the dry season availability, watering frequency, water sharing requirements and price per irrigation varied.

By studying the importance of these factors in farmers' choices, economists could estimate the implicit willingness to pay, e.g. for an additional irrigation (see Figure 1). Choices could be compared to farm characteristics, such as where farmers lived or what kind crops they planted. Answers can also be compared with how much farmers say they pay or receive in purchase and sale of water with neighbours, or how much net income a crop is yielding compared to the amount of water farmers say they use.

Can we use these methods as a basis for fixing the absolute level of irrigation water prices? Which method should we choose? One thing that is useful about the studies is to show the large variation in profitability across crops and locations, as well as significant farm characteristics that make farmers more or less likely to support a water price reform. The results are more reliable when comparing the relative values from a given method between groups of farmers, rather than comparing absolute water values derived by different methods. A common message from the studies in Tungabhadra is that the variation in access to water and in implicit willingness to pay for irrigations indicates that a uniform pricing scheme will lead to resistance varying within a single command area, as well as across command areas in a River Basin.

The advantage of representative survey is that it can predict where resistance is likely to occur before a pricing reform is implemented. Answers to the choice scenarios are often not intuitive, at least not compared to political rhetoric about protecting the poor. For example, poor farmers in water scarce areas are significantly more willing to accept price increases against a guarantee of water than are rich farmers in water abundant areas.

Water rights? February and three months to go before the rains – algae cover a village tank used for drinking water in the tail-end of Distributary 54 T.L.B.C. Photo: David N. Barton

What <u>don't</u> economic valuation surveys tell us about the value of water?

Valuation surveys conducted in the project showed that techniques based on stated willingness to pay for water by farmers (choice experiment), produced the same order of magnitude estimates, with the same levels of uncertainty as other methods based on observed prices of water or farm yields and water use. All three methods applied had large levels of uncertainty due to large variation in patterns of water use captured in the study, combined with a relatively small sample size. Even assuming that the willingness to pay figures obtained accurately reflect the value that farmers put on irrigation water, they often include only the value of water for irrigation and domestic uses of canal water. In traditional water systems there is certainly also a greater chance of ignoring the "value" that long-standing water practices have for local social and cultural cohesion.

Surveys can address other non-market values of water in a limited way. When farmers were asked in our surveys to choose between scenarios with or without water sharing with downstream domestic users and environmental needs of the Tungabhadra river, they largely but not

always chose scenarios not involving water sharing. We used their responses to calculate the implicit compensation they would need to forego one irrigation in the dry season for the benefit of downstream users. Compensation requirements were generally higher than willingness to pay for an additional irrigation. Economists call this difference in willingness to pay and to accept compensation for the same amount of water "loss aversion". Loss aversion is greater with greater uncertainty about supply (you know what you've got, but not what you get). Although our choice experiments try to simulate what farmers would do if they knew what future water supply would be, it is not a good predictor of farmers *currently* do with supply uncertainty.

When is water pricing part of the solution to water scarcity?

Economists argue that water prices will encourage water conservation if correctly designed and enforced. In Karnataka water charges on a per crop area basis are only related to water used through the type of crop. Water charges are paid by farmers mainly to document ownership for obtaining credit or carrying out sale of land. Water charges are in fact a mix of land tax and credit charges. Linking water charges closer to water volume used, for example through payment per irrigation, would make prices a water conservation tool. In the context of the choice experiment there is perfect information about what water is on offer and how much it costs – although this is a form of scenario analysis it shows that volumetric pricing itself is not the problem.

A water pricing scheme should channel information to farmers on the value of water conservation, as a canal may carry water itself. Water pricing scheme can be seen as a possible component of the infrastructure of large scale irrigation projects. If it is not maintained it will leak; if there is no water it is irrelevant; if there is abundant water it may be ignored; if there are cheaper ways of obtaining the water and the information, they will be used instead.

Water pricing as good infrastructure ?
Photo: David N. Barton

If the institutional and administrative problems mentioned in introduction are reduced water pricing may have a role to play as a tool in water management. In that setting economic valuation studies can be used to assess the effects of different water pricing schemes, complementing data on better monitoring of cropping patterns and water use. In the present setting water price reform in Karnataka seems to be one of the last in a number of other policy reform steps that need to be undertaken.

Water pricing as bad infrastructure ?
Photo: David N. Barton

A well functioning water pricing scheme channels information to farmers as a canal carries water. If it is not maintained it will leak; if there is no water it is irrelevant; if there is abundant water it may be ignored.

Conclusions

In Europe, water pricing reform is also on the table as part of the EU Water Framework Directive's drive to cover the costs of water services, including the costs imposed on downstream users and the environment. We suspect that authorities and utilities water in Europe find so-called "full cost recovery" pricing of water services difficult for many of the same reasons as direct cost recovery is difficult in Southern India, although the intensity of the problems are of course different. In both cases, water pricing reform must follow on from other reforms that guarantee delivery of the water services, be it irrigation water availability or water quality. With this Policy Brief we have tried to show that the relevance of economic valuation studies depends on where you are in a broader agenda of policy reform in the water sector. Ideally, economic valuation studies provide support for differentiating water pricing regimes within and across command areas in Karnataka (economic efficiency argument), as well as designing more volumetrically based prices (water conservation argument). In the present institutional and political context in Karnatak, this would be seen as "fine tuning" a policy that doesn't work from the outset. At present a valuation study, such as the choice experiments carried out in irrigation command areas in the Tungabhadra, can play two more limited roles:

(i) flag the revenue raising potential of a well-functioning irrigation infrastructure, freeing up budgets for other development objectives and for benefit sharing with water constituencies;

(ii) lending statistical support to the argument that farmers are acting rationally in their use of water within the existing institutional set-up.

With the choice experiment we can show that farmers are likely to continue to act in an economically rational way if volumetric pricing were introduced *as a consequence of* improvements in irrigation infrastructure and supply certainty. We recommend using economic valuation surveys, which can be good at representing spatial and socio-economic distribution of water uses and policy preferences , with participatory methods, which are good at explaining motives.

Water valuation and pricing in the EU Water FrameworkDirective

The EU Water Framework Directive (WFD) has as its main objective the achievement of "good" ecological and chemical status of all waters by 2015. As part of WFD implementation economic valuation of water can play two specific roles. (i) The WFD requires water utilities in Member States to set water prices to the cover the costs of water services (art.9). But is allows for pricing exceptions in order to provide affordable water to poor users. Studies of willingness and ability to pay can determine when full cost recovery water pricing is feasible. (ii) River Basin Authorities are also required to implement cost-effective programmes of measures (art. 11) to reach the WFD objectives. However, if the costs of measures are disproportionate to the benefits of achieving good ecological status, River Basin Authorities can obtain a "derogation" (art. 4) and implement less ambitious measures Economic valuation may be used to determine how large the economic benefits are, and so justify or not further measures. While the WFD encourages the use of water valuation as an input to policy, examples of Member States actually commissioning valuation studies in the context of WFD's aims are not common. More information about water economics and the WFD: http://www.aquamoney.org/

STRIVER

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The Briefs are also available online: www.striver.no

About STRIVER
STRIVER- Strategy and methodology for improved IWRM - An integrated interdisciplinary assessment in four twinning river basins is a three year EC funded project 2006-2009 under the 6th framework programme (FP6) coordinated jointly by Bioforsk and NIVA. The point of departure for STRIVER is the lack of clear methodologies and problems in operationalisation of Integrated Water Resource Management (IWRM) as pointed out by both the scientific and management communities.13 partners from 9 countries participate as contractual partners in addition to an external advisory board.

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