THE MARKETS FOR ECOSYSTEM SERVICES PROJECT

Fact sheet 3: Market-based instruments for managing irrigation salinity

THE ISSUE

Irrigated agriculture in Australia often leads to net recharge of shared groundwater systems beyond their capacity to convey water causing local and regional salinity and water logging. In turn, salinity and water logging impose a range of costs on individual landowners, their neighbours and the wider community – primarily reduced agricultural productivity, damage to ecosystems and degradation of built infrastructure both locally and off-site. Some of these costs are not fully included in farm management decisions because they are external to landowners.

THE PROJECT

CSIRO in conjunction with Drew Collins of BDA Group and Coleambally Irrigation Cooperative has been funded to develop a market based instrument to manage irrigation induced salinity by the National Market Based Instruments Pilots Program under the National Action Plan for Salinity and Water Quality. The project builds on previous work by Shahbaz Khan and colleagues at CSIRO Land and Water in Griffith to develop methods to physically measure recharge from irrigation systems and the resultant biophysical and economic impacts.

CONCEPTUAL FRAMEWORK

This pilot is based on developing (cost-effective) incentives to individual irrigators that reflect their impact on a shared groundwater aquifer. The shared resource means that one individual's actions may affect other irrigators and the wider community. Any proposed solution must therefore be based on sound biophysical information, and development of individual incentives that reflect these biophysical relationships

Behavioural responses to incentives are also dependent on the nature of the motivation. Prescription or standard based regulations allow no flexibility for individual responses. Persuasion relies on sufficient motivation through peer pressure and information about the impacts on others. Payments and tradable property rights systems allow maximum flexibility whereby the lowest cost individual management solutions may be sought across the shared aquifer.

BIOPHYSICAL INFORMATION

Information is required about individual irrigator's impacts on shared groundwater aquifers and the consequences of these actions. In the Coleambally region there are more than 800 shallow and deep piezometers that have been used to model regional groundwater movement. Information from these wells and regional groundwater models has been used to build to calibrate the SWAGMAN® series of models by Shahbaz Khan and colleagues at CSIRO in Griffith. Their research has resulted in the development of the concept of "net recharge" as an important management tool in the region and beyond. Elements of the SWAGMAN® series are able to estimate biophysical relationships at the paddock, farm, sub-region and regional scale for different variables including soils, crops, irrigation technologies and climatic outcomes.

INDIVIDUAL INCENTIVES FROM MBIs

A number of issues must be addressed in developing a biophysically integrated market mechanism including:

- ? How to measure property rights?
- ? Who should hold property rights –irrigators only or also water supply authorities and community organisations?

? What total quantity of property rights should be allocated?

? How should these property rights be allocated amongst irrigators?

? What compliance monitoring should be established? Who should police it?

? How to include flexibility in adoption and management – for example through banking and borrowing?

? What would a recharge market look like?

? Should activities to 'offset' net recharge be allowed?

WORKING WITH THE COMMUNITY

For irrigators and the community, the development and implementation of an integrated market-based solution presents substantial challenges and changes in their approach to recharge management. So to adopt a new instrument the community must be comfortable in engaging and using the mechanism.

The community will need to carefully consider the options available and will need support and information from biophysical and social scientists. Trial of any proposed changes within pilot areas across the region, for example through the use of experimental economics, will enhance the confidence of the community.

The community can the make an informed decision about whether to proceed based on what they have learnt about the problem and the advantages and disadvantages of the solution compared with continuing the current strategy.

WHAT DO WE HOPE TO LEARN

The pilot must strike a balance between delivering better environmental outcomes and imposing additional costs on irrigation communities. Within this context we hope to learn more about:

✓ Developing property rights and markets for the management of problems which are difficult to measure because of their with dispersed sources. In particular we hope to learn more about the integration of advanced biophysical models (such as SWAGMAN®) with market mechanisms;

✓ How to allocate and monitor property rights for aspects of existing systems – in this case irrigated agriculture;

✓ Integration of beneficial and harmful actions across different timeframes within a single market; and,

✓ How to measure the nature and scale of the gains from trade using MBIs when compared to existing systems (including the cost of implementation).

The lessons learnt will be valuable in the development of other integrated biophysical models and MBIs, especially those targeting nutrient and salinity management.

WE WANT TO HEAR FROM YOU!

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