

Monitoring Economic and Social Changes within NSW Water Sharing Plan Areas:
A Participatory Approach

Maksudul Bari*, Inderpal Singh* and Noel Flavel**

A contributed paper presented at the 52nd Annual Conference of the
Australian Agricultural and Resource Economic Society
Canberra, Australia
6-8 February 2008

Abstract

This paper presents a participatory approach being used to monitor the changes in economic and social indicators within the Water Sharing Plan areas in NSW. The approach entails close cooperation and input from the stakeholders comprising engagement and scoping; profiling, literature review and media scanning; indicators selection; data collection; and analysis and reporting over time. The monitoring data on the key economic and social indicators will be used for review of the Water Sharing Plans as well as further refinement and development of water policies in NSW. This framework provides the basis for developing similar monitoring programs.

Key Words: Monitoring, Irrigation Industry, Water Sharing Plans, Economic and Social Indicators, Methodology, Participatory Approach

* NSW Department of Water and Energy, PO Box 3720, Parramatta NSW 2124

** NSW Department of Water and Energy, PO Box 550 Tamworth NSW 2340

Note: The views expressed in this paper are those of the authors and do not necessarily represent the views of the NSW Department of Water and Energy

INTRODUCTION

A *participatory approach* is a framework through which the views on the issues of all interested parties - also called stakeholders - are solicited, taken into consideration and integrated into decision making. Participation is a process through which stakeholders' influence and share control over initiatives and the decisions and resources which affect them (WEDC 2007). Unless the stakeholders are given an opportunity to participate in the development of policy initiatives designed to improve their livelihoods, they will continue to reject and be reluctant to cooperate with such initiatives.

In fact, participatory research can be seen more as an approach than consisting of specific techniques (IDRC 2007). This approach identifies what outcomes are important to those affected by policy interventions themselves and they can help untangle complex processes of individual and community change. Participatory approaches are particularly useful in providing feedback to policy-makers.

A participatory method generates a sense of ownership of decisions and actions. This approach to research is a bottom-up rather than a top-down method and attempts to be an interactive process, rather than a one-off exercise to extract information from people (ADB 2004). Thus it increases the value of the research outcome and makes the results more acceptable to the stakeholders.

The NSW Department of Water and Energy (DWE) is monitoring the economic and social changes in Water Sharing Plan (WSP) areas that commenced in July 2004. This monitoring program has been developed using a participatory approach, rather than an expert driven process. The expert driven approach lacks the sense of ownership and understanding of the issues and objectives by the stakeholders. It also has the risk of non-cooperation in accessing data, non-acceptability of the results leading to possible challenges by the stakeholders and the failure of the policy initiatives.

In order to overcome these drawbacks, the monitoring program has been developed in conjunction with the key body representing irrigators, the NSW Irrigators' Council (IC), and co-ordinated with stakeholder interests and inputs through the Primary Industries and Economic Development Standing Committee of the NSW Natural Resources Advisory Council (NRAC). A Technical Advisory Panel (TAP) with expertise in economics and social assessment, monitoring and water policy areas has assisted the Economics Unit of DWE in developing the monitoring program.

OBJECTIVE OF THE PAPER

Successful implementation of the current reform agendas of water resource management, in particular those relating the WSPs, requires the establishment of an effective program to monitor the changes in key economic and social indicators relating to the irrigation industry within the areas covered by the WSPs. The monitoring program should ensure that is useable, cost effective, accurate, comprehensive and transparent.

The objective of this paper is to present a methodology as applied to monitor the changes in economic and social indicators within the irrigation industry in the WSP areas in NSW.

The section below discusses the introduction of WSPs in NSW and need for their monitoring. This is followed by the phases of the approach comprising the framework developed for the

WSP monitoring program, each of which are elaborated upon in detail. Finally, the paper presents the timeframe for the current socio-economic monitoring program, the benefits and risks involved in the approach, and concluding remarks.

WATER SHARING PLANS AND NEED FOR MONITORING

Increasing competition for water between human and environmental needs and between the various types of human uses led the NSW Government to announce a comprehensive reform of water management in 1995. A milestone in these reforms was the Water Management Act (WMA) 2000 that made provisions allowing water for the environment while securing its supply for consumers. Under the WMA 2000, new water sharing arrangements between the environment and water users were initiated and WSPs were developed through community consultation. A WSP is a legal document that establishes rules for sharing water between the environmental needs of the river or aquifer and water users, and also between different types of water users.

Thirty-one WSPs covering the regulated river systems as well as major unregulated rivers and coastal aquifers came into effect on 01 July 2004 (MAP 1 and Appendix Table 1). These plans accounted for 80 per cent of all the water used in NSW, and on average returning over 200 billion litres of water to the environment every year (DWE 2006). The inland groundwater plans commenced during 2006-07 except the Lower Lachlan Groundwater Plan which is expected to commence soon. To cover the rest of the water sources other water sharing plans including macro WSPs are at different stages of development and expected to commence in the near future.

Subsequent to the development of the 31 WSPs, the Council of Australian Governments (COAG) agreed to a National Water Initiative (NWI) covering a range of areas having greater compatibility and the adoption of best-practice approaches to water management nationally. The NWI provided NSW with an opportunity to make a number of important amendments to its WMA 2000 that would secure better water management outcomes as well as foster support for its framework from the Commonwealth Government and stakeholders. NSW signed the Intergovernmental Agreement on NWI at the COAG meeting on 25 June 2004.

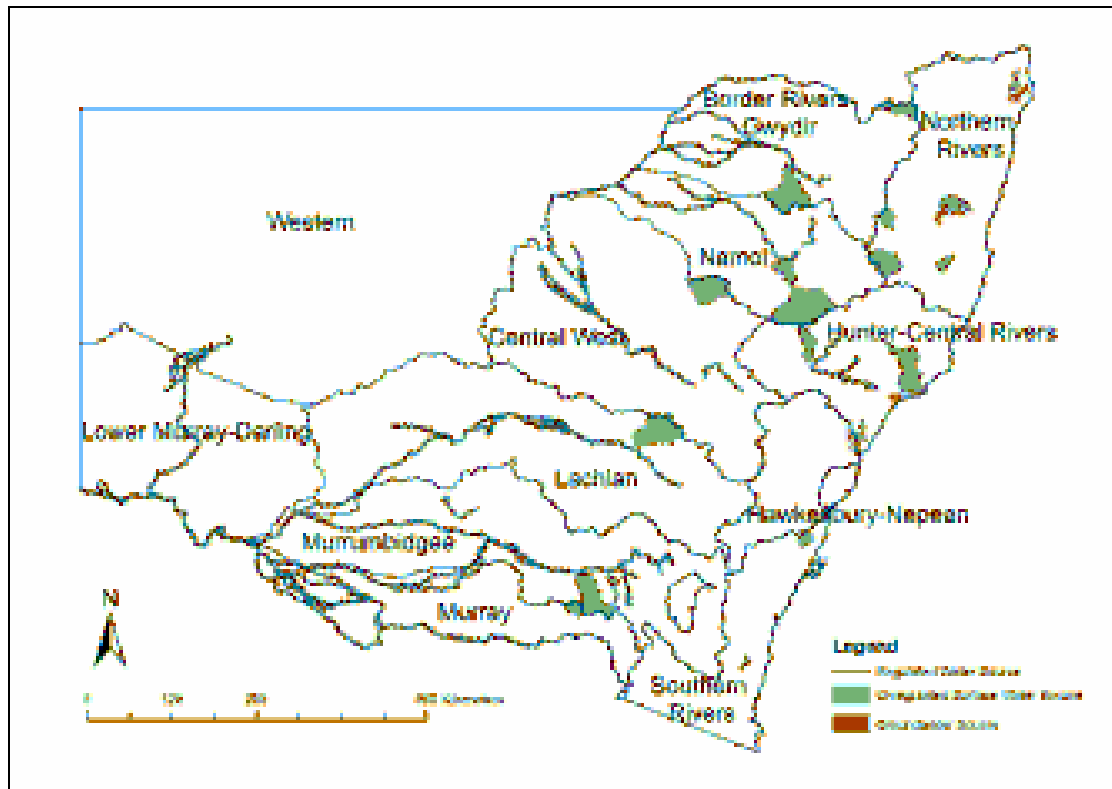
The NSW Government established the Natural Resources Commission (NRC) to provide an independent review of a wide range of natural resource matters, including WSP. The WSPs must be reviewed prior to the end of their first 10-year period so that appropriate amendments can be made to these plans for their second 10-year period. As part of this review the Minister has provided a commitment in his Ministerial Statement on NSW Water Reforms that 'future decisions on water will be based on the best scientific and socio-economic information'. Under this situation, monitoring of the potential economic and social changes of WSPs was commenced to provide information for the DWE and the NRC reviews.

The need for monitoring changes in economic and social indicators relates to

- the implementation of the NSW Water Reform Agenda, in particular the Water Management Act 2000;
- the policy imperatives in the NWI which is built on the previous COAG Water Reform framework; and
- the application of the monitoring and evaluation framework developed by the Monitoring and Evaluation Working Group of the NRM Ministerial Council.

Apart from providing input to the DWE's and NRC's reviews of WSPs, outcomes of the monitoring program will be used to gain a better understanding of the irrigation sector and inform industry and government decision-making processes on future water planning and management.

Map 1: WSPs in NSW Commenced on 1 July 2004



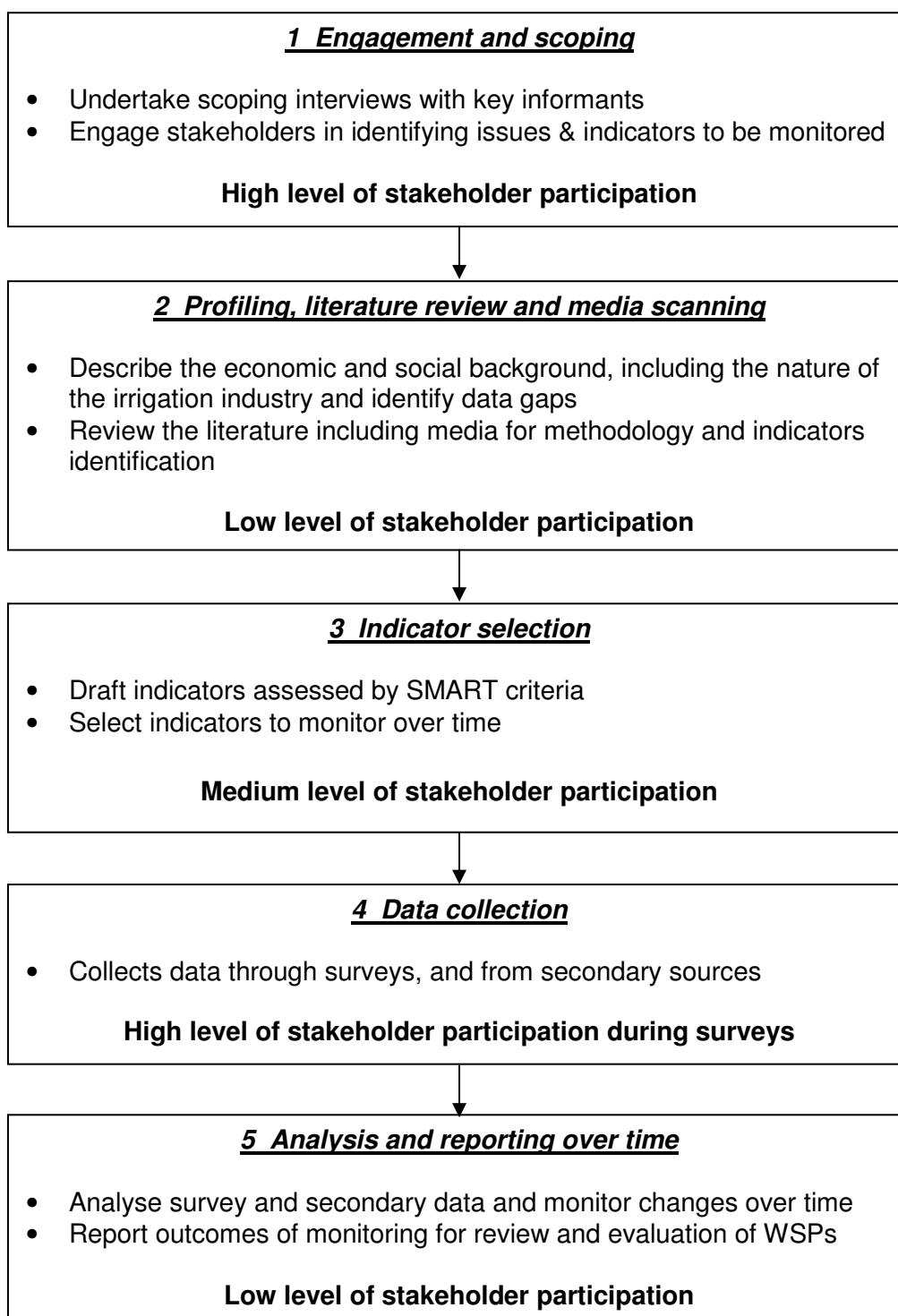
PHASES OF PARTICIPATORY MONITORING PROGRAM

The monitoring framework is based on a participatory approach and has five phases with each phase having varying degree of stakeholder participation. These phases include:

- Phase 1: Engagement and scoping
- Phase 2: Profiling, literature review and media scanning
- Phase 3: Indicator selection
- Phase 4: Data collection
- Phase 5: Analysis and reporting over time

Figure 1 provides a summary of the key actions that were undertaken under the 5-phased framework used for monitoring the changes in economic and social indicators. This figure also indicates the level of stakeholder participation in each phase. The following sections elaborate on how each of these phases has been applied to develop the monitoring program.

Figure 1: Phases of Economic and Social Monitoring of WSPs



PHASE 1: ENGAGEMENT AND SCOPING

In order to develop an effective program to monitor economic and social changes in the irrigation industry within the WSP areas the first building block was to engage with the stakeholder. This phase was important for building a sense of ownership amongst the stakeholder in the monitoring program. Successful engagement helped to:

- establish a rapport with the irrigation industry representatives;
- make them aware of the objectives of monitoring the changes in economic and social indicators in their respective areas; and
- encourage them to provide inputs in developing the program and participate in the subsequent phases.

Stakeholders' input on the important issues to be covered were collected through extensive scoping interviews with the stakeholders, in particular with the irrigators' representatives throughout the state.

Scoping Interviews

During August and September 2005, 50 irrigators' representatives of regional water users associations were consulted in 22 separate interviews about the social and economic issues of WSPs. In addition representatives from NSW Aboriginal Land Council and NSW Local Government Associations were also interviewed. Irrigators/stakeholders were asked about the kinds of indicators of the economic and social changes that they would like to see monitored over time. Interview topics included irrigators' water use and general history as well as the four major areas: water allocation, trade, environmental flows and the separation of land and water titles. Additional questions were asked about non-extractive uses of water such as tourism and recreation as well as regional or indirect social and economic effects.

The analysis of scoping interviews presented a 'big-picture' highlighting issues of concerns. Qualitative data were recorded digitally and in hand-written notes. The notes (backed up by transcription where necessary) were then content-analysed based on a) the four categories noted above and b) central issues emerging from irrigators as recurrent themes. It should be noted that the outcome of the scoping interviews was not representative of the population of irrigators; rather it represents the full range of issues, topics and points of concern to irrigators (see Appendix Table 2, Column 3).

PHASE 2: PROFILING, LITERATURE REVIEW AND MEDIA SCANNING

Profiling

Profiling the WSP catchments outlined the economic and social background in which the plans were implemented and provided a basis for on-going monitoring the changes of economic and social indicators for review of the WSPs. It identified where data was plentiful, scarce, out of date or non-existent and thus assisted to identify data gaps which needed to be filled through surveys.

It was revealed through profiling that data in the areas of farm production, gross margin, irrigated area, water use, water trade were available, but not in the scale that would be

required for analysis on the basis of each WSP. In addition there was no data on any social variables like knowledge, attitudes, beliefs etc.

Literature Reviews

Reviews of existing literature were conducted during the period prior to identifying indicators for monitoring were conducted to identify

- methodology used for monitoring, and
- key economic and social indicators.

Existing literature on monitoring methodology indicates that the methodology varies depending on the purpose of monitoring, the project to be monitored and the stage of the project cycle when monitoring is contemplated.

National natural resource management monitoring and evaluation framework (NRM Ministerial Council, 2003) was developed to assess progress towards improved natural resource condition. The framework requires that all stakeholders, including commonwealth, states, regions, communities, industries and environmental groups, must agree to the program including all performance indicators and associated data protocol, data collection processes and performance review requirements, roles and responsibility for collection, storage, analysis, reporting and monitoring.

An information package by the Australian Government provides advice and guidance on a range of monitoring and evaluation activities so that the community groups can monitor and evaluate government funded environmental projects (Australian Government, 2004). This document puts together a framework that includes questions to prompt thoughts on what to do and helps to decide on the critical steps needed to tackle problems.

A study on monitoring land degradation in South East Queensland and North East NSW to assess the extent of land degradation suffered by crop and beef farmers used a survey where farmers were asked to list any land degradation problem they were experiencing (Alexander F., 2003).

A discussion paper was prepared to consolidate a consistent approach to Natural Resource Management (NRM) in Western Australia by providing a framework that ties together policy and decision making to on-ground activities and monitoring and evaluation (EPA Western Australia, 2003). Under this NRM Program a state wide monitoring and evaluation framework has been designed. This embodied the environmental management system approach to NRM, which provides a systematic process for addressing NRM issues at a sector or regional/landscape scale. It is concerned with the collection and analysis of data/information to determine whether policy objectives are being met. Monitoring and evaluation informs NRM stakeholders on the difference between actual versus desired environmental outcomes and performance.

In Queensland, a framework has been established to measure and assess land, water, vegetation, biological and cultural resources, and landscape health and to assess the performance of programs, strategies, policies and structures, which support and promote the sustainable use, conservation, and rehabilitation of these resources (Queensland Government, undated). The framework outlines that monitoring must contribute to long term management capabilities, feeding back into management decision making processes.

Government of Western Australia published a paper to provide community groups with techniques for monitoring and evaluating river restoration works (Government of Western Australia, 2002). The paper defined monitoring as the gathering of information. It may involve observing or measuring change and is often the raw material or data used for evaluation. For example, a community group may monitor the survival rate of newly planted seedlings each month over a two year period.

The review of literature on monitoring methodology above indicates that there is a range of frameworks that are used in natural resources management monitoring and in each case the framework was designed depending on the specific objectives of the project.

Literature was also reviewed to identify the key economic and social indicators that were incorporated in the relevant studies (see Appendix Table 2 Column 4).

Media Scanning

The objective of media scanning was to identify issues that appeared in the day-to-day news articles over a period when the WSPs were in the process of being implemented. National, regional and local newspapers were scanned during March 2005 to February 2006 to capture the issues that were covered in relation to the WSPs commenced in July 2004.

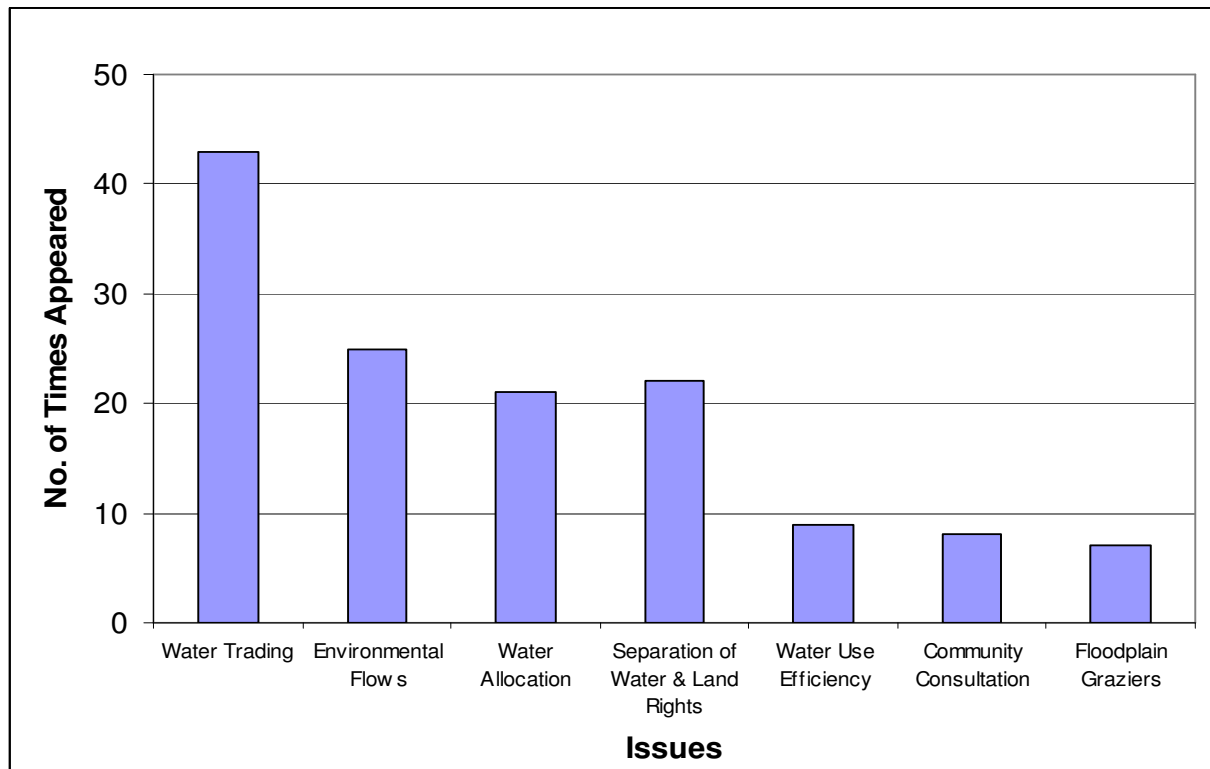
Articles were chosen for review on the basis of their relevance to key WSP themes, namely;

- water allocation available for extractive use;
- separated water and land rights;
- reforms to facilitate more trading in water; and
- provision of water to meet environmental needs.

The distribution of the seven most important issues that appeared in the media over the scanning period is presented in Figure 2. The 'water trading' issue was the most important one that appeared more than 40 times. The issues of 'environmental flows', 'water allocation' and 'separation of water and land rights' appeared 25, 22 and 21 times respectively. The other important issues were 'water use efficiency' (9), 'community consultation' (8) and 'floodplain graziers' (7).

Economic and social indicators that were selected from media scanning are presented in Appendix Table 2 (Column 4). The indicators identified through literature review and media scanning were taken into consideration when selecting the final set of indicators for the WSP monitoring program.

Figure 2: Distribution of issues/topics appeared in the media during March 2005 to February 2006



Source: Media scanning during 2005-06

PHASE 3: INDICATOR SELECTION

Indicators should have certain generic properties to be useful for monitoring purposes. It is important that the indicators are simple, measurable, accessible, relevant and provide timely information (SMART criteria). The indicators should be stated clearly and concisely and be easy to understand by the stakeholder, government, industry and the broader community. More specifically, an appropriately selected indicator should have the following:

- an agreed scientifically sound meaning;
- a sound and practical measurement process;
- relevance to the key policy question or critical theme;
- effectiveness and be cost-efficient;
- potential to be aggregated and disaggregated over a range of scales;
- usefulness in communicating with the community; and
- responsiveness to relevant economic, social and environmental factors.

The engagement and scoping phase, in conjunction with profiling, literature review and media scanning, provided the basis for making decisions regarding identification of economic and social indicators to be monitored over time. A draft set of key economic and social indicators for monitoring changes within the irrigation sector was then identified. This draft set was further refined in extensive consultation with the technical experts and the key

stakeholders, in particular with the peak irrigators' representative body, the NSW IC. During this process it was ensured that the indicators meet the SMART criteria, are sound on theoretical basis, and meet legislative requirements and stakeholders' expectations.

Participation of the stakeholders at this phase provided opportunity to confirm that the monitoring framework was technically robust and the indicators selected would result in scientifically sound baseline information for monitoring changes overtime. Selected indicators for monitoring are presented in Appendix Table 2 (column 5). These include both economic and social indicators that have been classified in the following major categories:

- Water use efficiency and productivity,
- Security of water access entitlement,
- Water markets and trading, and
- Economic benefits derived water extraction and use.

PHASE 4: DATA COLLECTION

Primarily, there are two sources of data, viz, a) data that are publicly available ie, secondary data, and b) data collected from the target population through sample survey and focus group ie, primary data. Data from the secondary sources are the most cost effective. However, data on many selected monitoring indicators, particularly those on social indicators are not available. Moreover, data on some indicators are not available in required scale or form. Given this situation, data on selected indicators need to be collected from both the sources.

The data on the identified indicators that are publicly available are to be collected from the relevant agencies/authorities like, water trading data from DNR/State Water and Irrigation Corporation websites, irrigated production and water use data from ABS Agricultural Census.

Data that is not available from secondary sources in the required scale and form need to be collected by using various primary data collection techniques such as surveys, scoping interviews, focus group meeting from representative samples. These include data on water use and production by crop type, dependence on irrigated agriculture, irrigated employment, attitudinal and awareness and other social variables.

Irrigators' Survey

A telephone survey of irrigators was undertaken during November 2006 to January 2007 with financial assistance from the NSW NRAC. The purpose of the first ever irrigators' survey in NSW 2005-06 was to collect primary quantitative social and economic data that, along with other secondary data, will establish baseline information to enable water sharing plans (WSPs) to be monitored.

The total population within the 31 WSP areas was approximately 10,900 irrigators (whether they have used their entitlement or not) at the time of the survey; which consisted of 5,500 water access licence holders and 5,400 shareholders within Irrigation Corporations, Private Irrigation Districts and Irrigation Trusts.

Questionnaire Design

The questionnaire for irrigators' survey was designed to make sure the views of the stakeholders were taken into consideration. It included 51 questions covering (i) water entitlement and use; (ii) the use and characteristics of irrigated crops and pastures; (iii) farm employment; (iv) water trading on the permanent and temporary water market and (v) attitudes and beliefs about water trading and the management and use of water. The questionnaire was developed by the project team in consultation with the NSW IC.

The questionnaire and interview methodology were pre-tested with 15 irrigators. Minor changes and amendments to the questionnaire were made based on the pre-test.

Identifying Irrigators

The names and addresses of access licence holders were available from the DWE database, although it did not include up-to-date telephone numbers for all licence holders. In addition, contact details for the shareholders of the Irrigation Corporations, Private Irrigation Districts and Irrigation Trusts were not available. The authorities of these corporations declined to provide shareholders' details on confidentiality grounds, but agreed to send any project information to their shareholders.

In order to identify contact information, all irrigators in the WSP areas holding licences directly with DWE, or holding shares or membership of Irrigation Corporations, Private Irrigation Districts and Irrigation Trusts were invited to participate in the telephone survey. The NSW IC, the peak representative body of irrigators' associations throughout the State, was closely involved ensuring stakeholders' participation in this process.

A joint letter by the NSW DWE and the NSW IC was sent to all 10,900 irrigators inviting Expressions of Interest to voluntarily participate in the telephone survey of irrigators. To encourage irrigators' participation in the survey, the NSW IC offered a prize consisting of a \$1,000 Travel Voucher from Harvey World Travel. A joint reminder letter was sent subsequently to increase the number of responses. A media release was also issued by the Minister to emphasise and highlight the importance of the irrigators' survey.

A total of 1,502 irrigators indicated their willingness to participate in the survey and provided their name and phone contact details.

Telephone Survey of Irrigators

A consultant was appointed to undertake the telephone survey. The interviews were completed during November 2006 to January 2007. Table 1 presents the number of irrigators who participated in the survey out of the 1,510 irrigators who indicated willingness. Most of them were contactable by telephone and 1,124 irrigators were interviewed representing 74% of irrigators in the contacts database. At the aggregate level, this yielded a statistically reasonable final sample, with over 10% of the irrigator population being surveyed. The reasons for non-completion of interviews are also shown in Table 1, with the most common reason (15%) being an inability to contact the irrigator after three attempts.

Table 1. Sample response and reasons for non completion of interviews, 2005-06

Reasons	Count	Percent
Interview completed	1,124	74.4
No answer or not available	226	14.9
Faxed but no return	59	3.9
Refusal to participate	45	3.0
Listed phone number had been disconnected	39	2.6
Stated they had already completed the survey (although not completed)	18	1.2
Total	1,510	100.0

Note: "No answer or not available" includes answering machines, no answer, and contact person not available after three call backs.

Of the 1,124 irrigators in the sample, 9 irrigators could not be associated with a CMA boundary

Source: Irrigators' Survey 2005-06

Secondary Data

Data on selected indicators that are publicly available are being collected from respective sources. For example, data on the volume and price of water traded have been collected from the internet-based database of DWE, and Murrumbidgee and Murray Water Exchanges. Data on irrigated area and water use by crop will be collected from ABS Agricultural Census 2006 that is expected to be available within next few months.

The other secondary sources from which data on relevant indicators are being collected on-going basis include ABS Annual Agricultural Surveys, ABARE Irrigation Studies, NSW Department of Primary industries, various ABS annual/periodical reports like Water Use in Australian Farms, Water Account, Water Access Entitlements, Allocations and Trading, National Water Commission on Australian Water Resources 2005 etc.

PHASE 5: ANALYSIS AND REPORTING OVER TIME

The final phase of the social and economic monitoring program of WSPs is to analyse both primary and secondary data on the indicators identified through the earlier phases to monitor changes in water use, water use efficiency, area under irrigation, value of irrigated production per ML, volume and price of water traded etc. and prepare reports for the clients over time. The analysis will be done by using simple and suitable techniques such as tabular analysis, percentages and ratios.

Deriving unequivocal conclusions about the socio-economic effects of WSPs is not expected to be an easy task and is out of the scope of this monitoring program. However, where large changes on the key social and economic indicators are observed, specific dedicated studies will be undertaken to study the causal effects for such changes.

Data Aggregation

The 31 WSPs range from small to very large in areas covered, volume of entitlements, number of licenses/irrigators and complexity. These include WSPs for 7 regulated rivers, 5 groundwater sources and 19 unregulated rivers. One WSP has no irrigators; several others are very small in terms of volumes of extracted water and number of irrigators. These WSPs are too small to warrant reporting on an individual basis.

Some problems engulfing small WSPs include:

- respondent data confidentiality,
- cost of gathering information,
- willingness of irrigators to volunteer, and
- statistical significance

These small WSPs are in stark contrast to the 7 regulated river WSPs, which are large in the following respects: geographically, volumes of entitlements, and number of licenses and irrigators. The irrigation technologies used and the land use are also large scale and diverse.

The review and evaluation of the WSPs has to determine the performance of the plan against its objectives. This will require monitoring information at individual WSP level. All attempts were made to collect data from a sample representing all WSPs independently from those who expressed their willingness to participate in this survey. However, after initial analysis of the irrigators' participation in the survey, it is observed that WSPs will need to be clustered to present meaningful results, in particular the smaller unregulated and coastal ground water WSPs.

Although the sample consisted of 1,124 irrigators which represented over 10% of all irrigators in the 31 WSPs in NSW, it was still too small to report statistically valid results for each of the 31 WSPs separately. Some amalgamation of results was required to reach reasonable levels of statistical validity. At the same time the NSW NRC is planning to review the WSPs at the major catchment levels, which is equivalent to the boundaries of Catchment Management Authorities (CMA). It was, therefore, decided to aggregate and report the results at the CMA level (Table 2). A full listing of the CMAs and the WSPs that are included in their area of operation is provided in Appendix Table 1.

Even at a CMA level the sample size for some CMAs was still too small to present statistically meaningful findings that could be used to develop generalised conclusions. Therefore further aggregation was required, resulting in the Border Rivers-Gwydir and Namoi CMAs being reported together as were the results for the Lower Murray-Darling and the Murray CMAs. The sample size for the Southern Rivers CMA (Table 2) was considered to be statistically too low to enable a detailed analysis and there was not another appropriate CMA with which to amalgamate the results. Therefore the analysis for this CMA was not reported separately, although these irrigators are included in the NSW total.

Table 2. CMA population and sample sizes of irrigators and entitlements, 2005-06

CMAs	Population of Irrigators		Sample of Irrigators		Relative Percentage	
	Size	Entitlement	Size	Entitlement	Size	Entitlement
Border Rivers-Gwydir and Namoi	567	1,117,545	73	125,340	12.8	11.2
Central West	642	704,085	81	83,217	12.6	11.8
Hunter-Central Rivers	1,769	219,236	239	45,433	13.5	20.7
Lachlan	882	615,874	126	142,887	14.3	23.2
Lower Murray Darling and Murray	3,282	2,395,267	316	339,173	9.7	14.2
Murrumbidgee	3,281	2,530,841	182	253,565	5.5	10.0
Northern Rivers (coastal)	396	27,282	83	8,253	21.0	30.3
Southern Rivers (coastal)	82	5,230	15	832	18.3	15.9
Total	10,901	7,615,360	1,115	1,013,410	10.2	13.3

Note: Of the 1,124 irrigators in the sample, 9 irrigators could not be associated with a CMA boundary
 Source: Irrigators' Survey 2005-06

Monitoring Reports

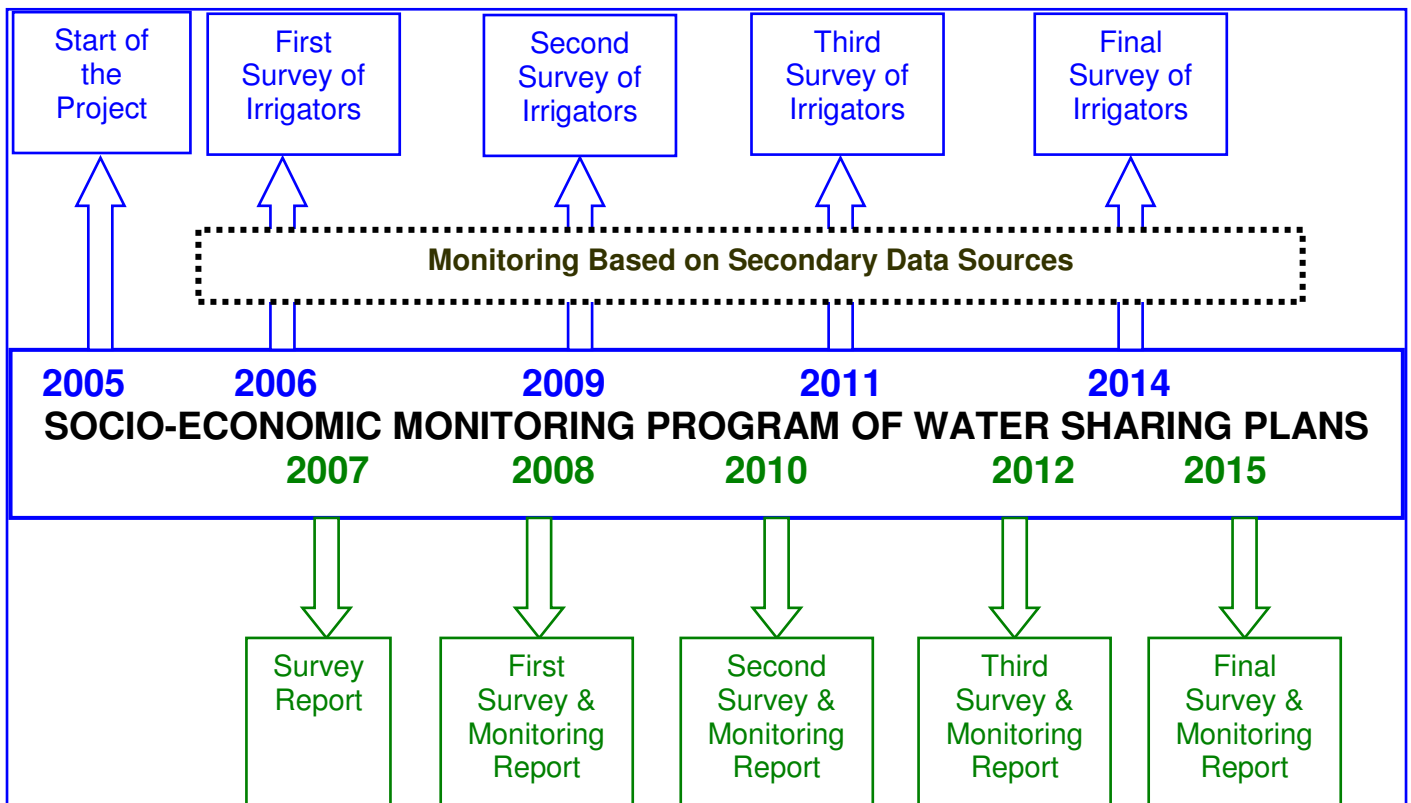
The monitoring project will produce a number of reports to meet the government review and stakeholders' requirements. The main monitoring reports will be presented on the basis of CMA boundaries. Whereas, other reports will provide information going down to the WSP level (subject to the availability of reasonable sample size) giving distinction for the type of water source covered by the WSP: Regulated River, Unregulated River or Groundwater. Where possible, the large and complex regulated river WSPs will be reported on an individual basis. Before finalising, various stakeholders will be consulted to develop an agreed grouping based on geographic location, climatic conditions and land use pattern.

MONITORING TIMELINE

The information collected through the survey and secondary data analysis would form the baseline data. Collection and analysis of secondary data, as and when available, is an ongoing process through out the life of the project. To measure and monitor the changes in socio economic indicators in the irrigation industry over the current tenure of the WSPs such secondary data need to be supplemented through subsequent survey data.

Ideally, survey data on economic and social indicators should be gathered annually/bi-annually and the results of monitoring activities are to be reported every 1-2 years. However, considering the resource constraints, it is planned that the survey of irrigators under this monitoring program will be repeated three more times over the tenure of the current WSPs: next in 2009 followed by a third survey in 2011 and finally in 2014. The timeframe of the proposed surveys, along with the time of reporting are presented in Figure 3.

Figure 3: Survey and Reporting Timeline
 (Future surveys are subject to availability of funds)



ADVANTAGES AND RISKS OF THE PARTICIPATORY APPROACH

There are a number of key characteristics of the participatory approach that need to be considered at the early design stage. The following list commends its use particularly for long term projects like monitoring. The inclusive nature of the process aims to engage with all the stakeholders.

In particular, the advantages of the participatory approach are that it:

- encourages participation from all relevant sectors of the industry, leading to a greater sense of ownership amongst stakeholders;
- provides a common and thorough understanding of issues, objectives, indicators, methodology and resource constraints;
- helps to identify all key issues including social, political, local, structural, market or production related issues;
- develops cooperation in accessing data, increases probability of broader acceptance of the results and confidence in the report; and
- reduces the risk of challenges and litigation, as the policies based on the outcomes of this approach are expected to be more acceptable to the stakeholders.

Along with advantages there are also certain risks associated with the use of this approach. The methodology can be:

- Time consuming,
- Resource hungry,
- Risk of losing control of the project and data, and
- Risk of losing on going cooperation from the stakeholders. This may happen if the project fails to deliver as per the expectations of the stakeholders.

In extreme cases, these risks may lead to failure if not managed carefully. Most of these require the negotiation of a balance between the competing objectives. Careful firm negotiation is required to maintain the focus of the project ensuring that the project is conducted according to the objectives and within the resource constraints. For example the requirement for a quick result can lead to some sections of the industry being excluded, which in turn may be compounded through incomplete issue identification, inappropriate indicator selection, lack of cooperation in data collection. This situation could result in a report that is not broadly accepted. On the other hand, in striving for complete inclusivity can result in unacceptable delays and frustration that in turn produce criticism and division.

CONCLUSIONS

The participatory approach is well suited to long term projects like monitoring where it is very important to get the project done properly and have general industry acceptance of the results.

The approach used in undertaking the socio-economic monitoring of the changes in the WSP areas has:

- established an excellent rapport with the main stakeholder, ie, the irrigators;
- engaged the stakeholders and taken into consideration their views/concerns throughout the monitoring program; and
- created a sense of ownership of the monitoring program by the irrigators' community resulting in clear understanding of the value of the outcome.

The positive outcome of the participatory approach was reflected in the response to a question in the irrigators' survey. Overwhelming majority of the irrigators (96%) responded 'yes' to a question on their willingness to participate in subsequent surveys.

Thus the participatory approach has been successfully used in the first stage of a long term project to monitor economic and social changes in NSW WSP areas and the estimates developed on the basis of the information collected through this monitoring program are expected to be robust and acceptable to the stakeholders.

The framework developed and used to monitor economic and social changes within the irrigation industry in the NSW WSP areas is applicable for other monitoring programs in natural resources planning and management.

Acknowledgements

NSW Department of Water and Energy (DWE) would like to thank and acknowledge the contribution of the NSW Natural Resources Advisory Council for providing financial assistance; the NSW Irrigators' Council, the irrigation corporations, trusts, private irrigation districts, and irrigator representatives for their cooperation and advice during various stages of the project. We also acknowledge the contribution of the irrigators who took time to participate in the survey.

Thanks are extended to Dr Mark Fenton, Environment & Behaviour Consultants of Townsville, Queensland, who undertook the survey of irrigators' in 2005-06 on behalf of NSW DWE and Dr Jacquie Tracey, Department of Environment and Climate Change, Dr Anna Carr, Bureau of Rural Sciences and Dr David James, Ecoservices, for their valuable input during various stages of the project.

BIBLIOGRAPHY

Alexander F., B.A.C.L.N.R. "Monitoring Land Degradation in South East Queensland and North East NSW." ABARE conference paper 03.6 (2003)(Abstract)

ADB 2004, <http://www.adb.org/Documents/Reports/Evaluation/sst-reg-2005-01.pdf>, Effectiveness of Participatory Approach, Asian Development Bank

Australian Government. "Envirofund Monitoring and Evaluation Pack." Envirofund, www.nht.gov.au/envirofund/publications/m-e/pubs/pack.pdf (2004) (Abstract).

Australian Government, Productivity Commission, 2005, Rural water use and the environment: The role of market mechanisms, Issues Paper, December.

Australian Government, National Water Commission 2007, Australian Water Resources 2005: Key findings of the baseline assessment of water resources for the National Water Initiative, Final Report.

Bjornlund, H 2002, The socio-economic structure of irrigation communities-water markets and the structural adjustment process, Rural Society, Vol 123, No 2, Pg 123-147.

Connell, D; Dovers, S and Grafton, R Q 2005, A critical analysis of national water initiative, The Australasian Journal of Natural Resources Law and Policy, Volume 10, No. 1, pp. 81-107

Cruse, Lin 2006, Cap and trade versus water recovery, paper presented at the Australian Agricultural and Resource Economics Society 50th Annual Conference, 8-10 February, Sydney

Department of Environment and Heritage, Natural Resource Management Ministerial Council, 2001, National Framework for the Management and Monitoring of Australia's Native Vegetation, ISBN 0142 254775 0.

DWE 2006, http://dnr.nsw.gov.au/nr/p/water_mngt_4pp_broch.pdf An Introduction to Water Management – A Booklet.

DWE 2007. Monitoring Economic and Social Changes in NSW Water Sharing Plan Areas – Irrigators' Survey 2005-2006, NSW Department of Water and Energy.

EPA Western Australia. "State Monitoring and Evaluation Framework Discussion Paper." Environment Reporting Series, Discussion Paper No. 1 (2003)(Abstract)

Government of Western Australia. "Monitoring and evaluating river restoration works - advisory notes for land managers on river and wetland restoration", Water Notes for Rivers Management (2002) (Abstract).

Goesch, Tim 2001, Delivery charges for water-Their impact on interregional trade in water rights, Australian Commodities, Vol 8, No 3, pp. 626-634, December

Heaney Anna, Dwyer Gaven, Beare Stephen, Peterson Deborah and Pechey Lili, 2005, Third party effects of water trading, American Agricultural Economics Association, Providence, Rhode Island, Conference Paper, 25-27 July

IDRC 2007, <http://www.iisd.org/casl/CASLGuide/ParticipatoryApproach.htm>, International Development Research Centre.

Irrigators' Survey 2005-06, Monitoring economic and social changes in NSW Water Sharing Plans.

Keenan P Sean, Krannich S Richard and Walker S Michael, 1999, Public perceptions of water transfers and markets: Describing differences in water use communities, *Society and Natural Resources*, No. 12, pp. 179-292.

NRM Ministerial Council. "National Natural Resource Management Monitoring and Evaluation Framework." Unpublished Document (2003)(Abstract)

Queensland Government. "Monitoring and Evaluation Implementation Plan for the National (Australian & State) Programs." (undated)(Abstract)

Taylor, A.W.T. "Non-Structural Stormwater Quality Best Management Practices: Guidelines for Monitoring and Evaluation." Technical Report No 03/14, Cooperative Research Centre for Catchment Hydrology and EPA Victoria (2003) (Abstract).

Tisdell John, Ward John and Grundzinski, 2001, Irrigator and community attitudes to water allocation and trading in the Fitzroy Catchment, Cooperative Research Centre for Catchment Hydrology, Griffith University, Technical Report 01/02, June.

WEDC 2007, <http://www.sanicon.net/titles/topicintro.php3?topicId=23>, Water, Engineering and Development Centre.

Young Mike and McColl Jim, March (2003), Robust separation of interests, *Agricultural Science*, Vol. 16, No. 1, Pg. 17-22

Appendix Table 1 List of Water Sharing Plans by CMA/CMA groups commenced at July 2004

CMA	Regulated WSPs	Unregulated WSPs	Groundwater WSPs
Border Rivers-Gwydir and Namoi	Gwydir Regulated River Namoi Regulated River	Rocky Creek etc. Phillips Creek etc Tenterfield Creek	
Central West	Macquarie and Cudgegong Regulated Rivers	Castlereagh River above Binnaway	
Hunter-Central Rivers	Regulated Hunter River	Wybong Creek Jilliby Jilliby Creek	Kulnura Mangrove Mountain GW Tomago Tomaree Stockton GW
Lachlan	Lachlan Regulated River	Mandagery Creek	
Lower Murray Darling and Murray	NSW Murray – Lower Darling Regulated Rivers	Upper Billabong	
Murrumbidgee	Murrumbidgee Regulated River	Adelong Creek Tarcutta Creek	
Northern Rivers		Upper Brunswick River Coopers Creek Dorrigo Plateau Surface Water Apsley River Commissioners Water Toorumbee Creek Karuah River Ourimbah Creek	Alstonville Basalt Plateau GW Source Stuarts Point GW Source Dorrigo Basalt GW Source
Southern Rivers		Wandella Creek Kangaroo River	

Note: Dorrigo Plateau Surface Water and Dorrigo Basalt Groundwater Sources are covered by one Water Sharing Plan

Appendix Table 2 Indicators Identified through Different Phases and Selected for Monitoring

Key Areas	Legislative Requirement	Scoping Interviews	Profiling and Review	Selected for Monitoring
Water use efficiency and productivity	<ul style="list-style-type: none"> • Movement of water to higher value crops 	<ul style="list-style-type: none"> • Area developed for irrigation • Area irrigated • Crop area and production • Allocations decisions • Cropping strategies • Farm gate dollar value/ha/ML • Irrigation infrastructure • Management practices • Barriers to efficiency • Level of investment • Aspirations to efficiency 	<ul style="list-style-type: none"> • Investment in delivery capacity • Reliability of infrastructure • Management practices • Water allocation for irrigation • Water use patterns • Investments in improved efficiencies • Water savings • Investment in water use efficiency • Investment in irrigation technology • Borrowing water from future allocation • Banking water for future • Transfer of water based on marginal value product 	<ul style="list-style-type: none"> • Area irrigated by major crop/pasture type • Water use by major crop/pasture type • Reasons for irrigating • Water use relative to the value of production in irrigated agriculture • Water use per person employed in irrigated agriculture • Water use per ha • Movement of water to higher value crops • Irrigation technologies • Attitudes/Aspirations to water use efficiency
Security of water access entitlement	<ul style="list-style-type: none"> • 	<ul style="list-style-type: none"> • Attitude to separation of land and water titles • Perceived value of land • Perceived value of water • Attitude to security of access • Perceptions and rationale for allocation reductions • Level of awareness 	<ul style="list-style-type: none"> • Reliability of water delivery service • Water rights • Awareness of water reform • Economic and social implications • Decreased land values for irrigated farms 	<ul style="list-style-type: none"> • Level of awareness of provisions in WSP • Level of understanding of provisions in WSP • Perceived understanding about security on water rights • Loan security against water titles • Knowledge/info on entitlement
Water markets and trading	<ul style="list-style-type: none"> • Unit price of water Transferred • Total volume of access licence transferred in each water year 	<ul style="list-style-type: none"> • Reported purchase/sale • Permanent/temporary trade • Volume of water trade • Price of water trade • Source of information • Attitude to water trade • Rationale for water trade • Factors considered when trading • Aspirations for trading 	<ul style="list-style-type: none"> • Volume traded – temporary/permanent • Water allocation • Administrative cost of trading • Transaction cost of trading • Need for clear trading rules • Rationale for water trade • Income from water trade • Reasons for water trade • Barriers to water trade 	<ul style="list-style-type: none"> • Volume of water transferred each year (temporary and permanent) • Number of access licences transferred each year (permanent) • Extent of water trading – intra- and inter-valley/state • Unit price of water transferred (permanent and temporary) • Attitudes to water trading

		<ul style="list-style-type: none"> • Barriers to trade - impeding and facilitating factors 	<ul style="list-style-type: none"> • Price of traded water • Attitudes to trade • Impacts of water trading • Trading between rural and urban water • Information on water markets • Integrating rural-urban water markets • Inter-state trading 	<ul style="list-style-type: none"> • Aspirations for water trading • Knowledge on water trading • Level of information on water trading • Reasons for trading water
Economic benefits derived from water extraction and use	<ul style="list-style-type: none"> • Regional gross margins versus annual total extraction 	<ul style="list-style-type: none"> • Number and size of holdings operated • Labour and employment • Leasing and ownership patterns • Income from irrigation • Investment in irrigation equipment • Off farm investment • Turnover, profit-loss, gross margin • Debt-cost structure 	<ul style="list-style-type: none"> • Debt • Risk of financial failure • On-farm investment • Off-farm income • Farm income • Return on irrigation versus dryland 	<ul style="list-style-type: none"> • Value of irrigated production • Employment in irrigated industry • Ratio of the value of irrigated production to gross regional production. • Ratio of employment in irrigated industry to total regional employment • Farm size (ha/farm) in irrigated agriculture. • Number of family members engaged in irrigated farming. • Dependence on farming • Dependence on irrigated farming